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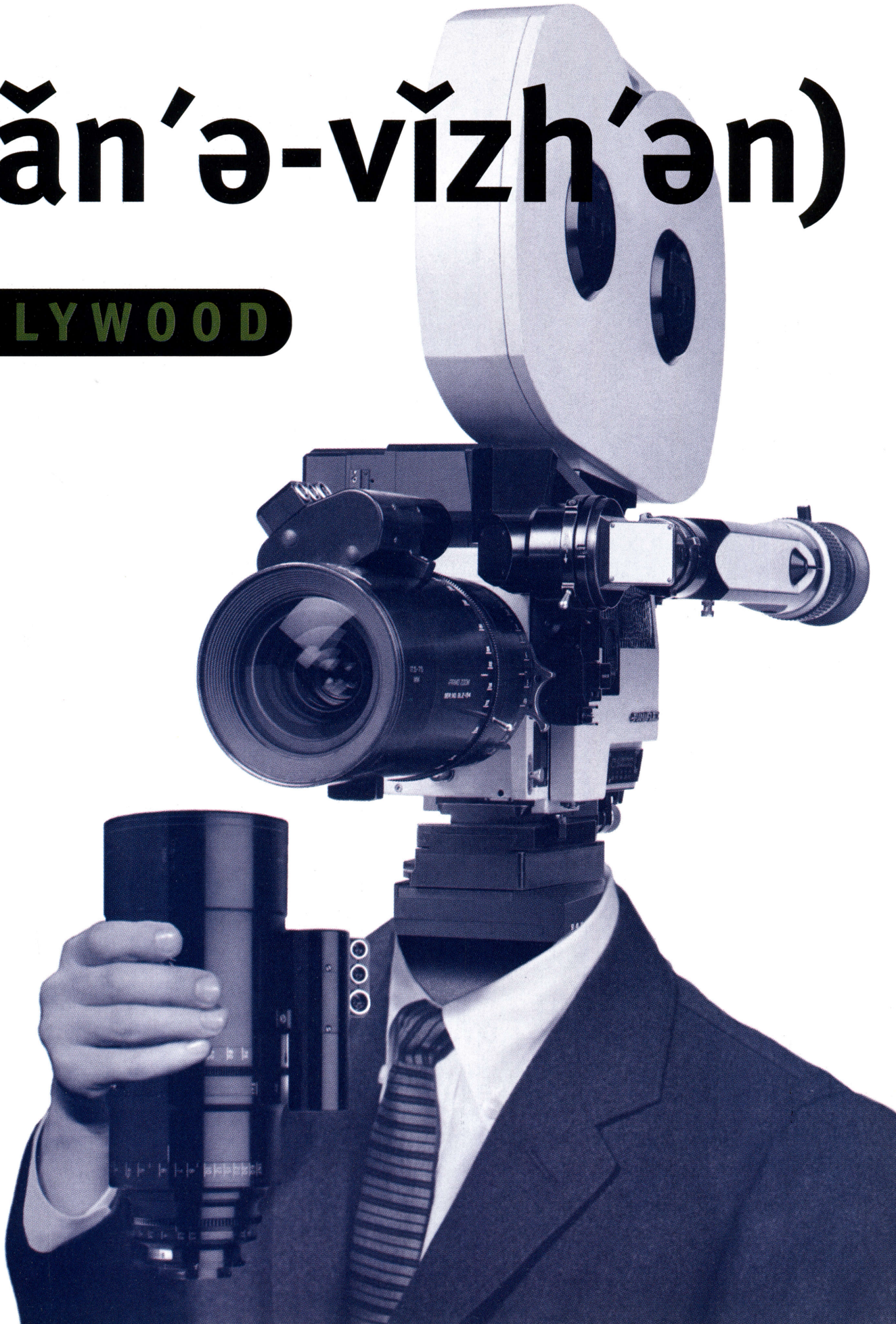

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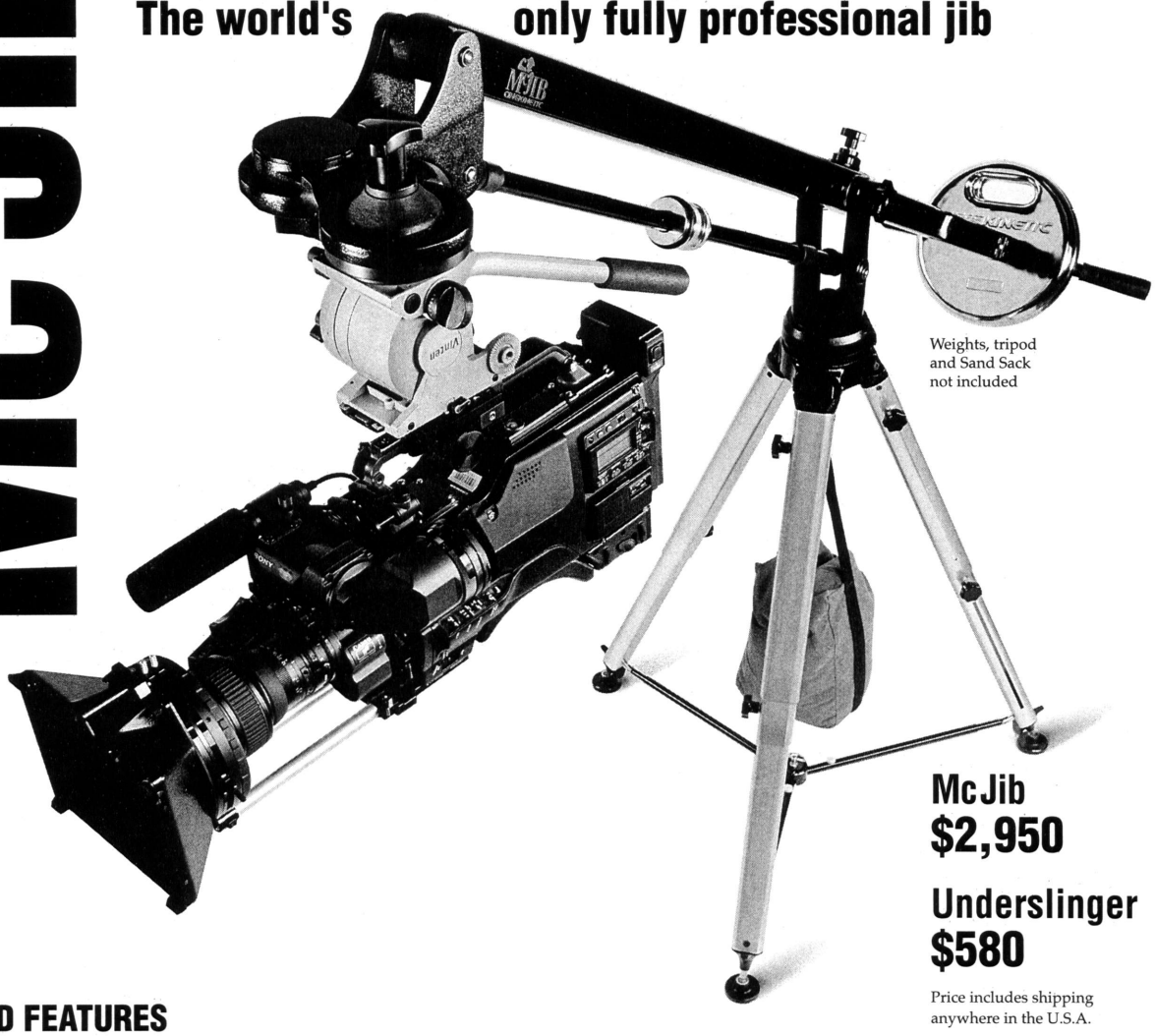

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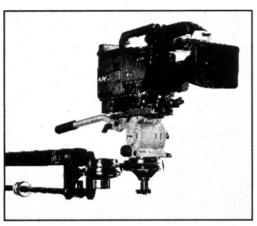

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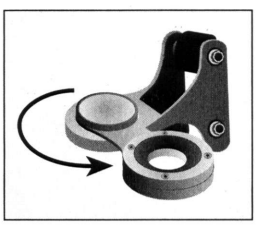

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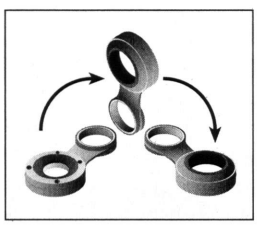

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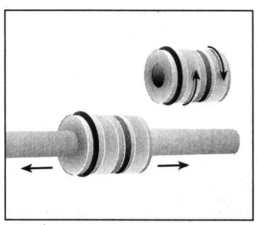

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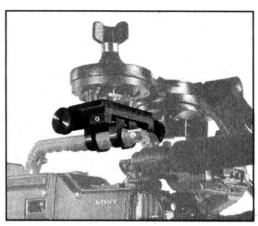

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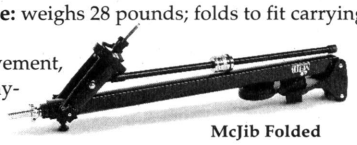

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August 1996 Vol. 77 No. 8

American Cinematographer

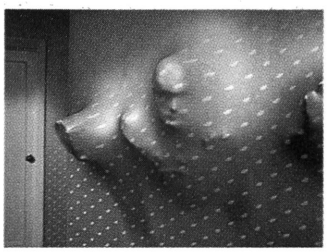
Features

30 Amazing *Special Effects*
Cinematic wizardry lauded in large format

38 Future Shock
T2 3-D transports viewers to the year 2029

45 Digitizing the Third Dimension
Eye-popping effects adrenalize *T2* attraction

52 Scared Silly
Horror and comedy collide in *The Frighteners*



52

62 Book Smart
Matilda lends zany edge to children's tale

72 Taking the Stand
Racism begets revenge in *A Time to Kill*

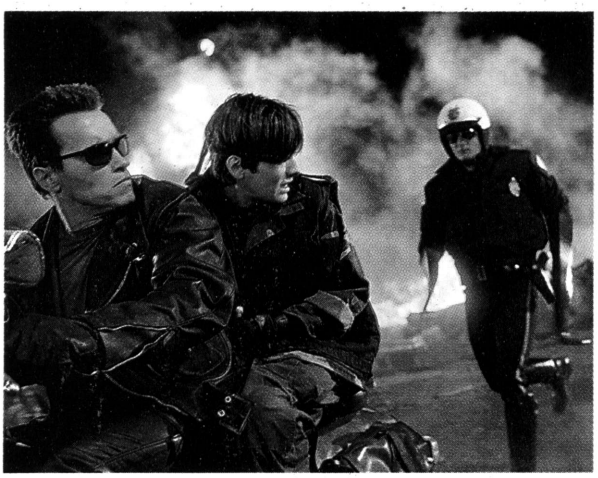
80 Trains, Veins and Heroin Deals
Trainspotting tours England's drug culture

88 *The Sea Hawk* Sets Sail
Pirate epic reaches port (Pt. 2 of 2)

62

Departments

10 Letters
14 Digital Perspectives
20 Production Slate
95 New Products
101 Points East
103 Books in Review
105 Classified Ads
110 Ad Index
111 From the Clubhouse
112 Filmmakers' Forum



On Our Cover: Arnold Schwarzenegger, Edward Furlong and Robert Patrick reprise their most famous roles in *Terminator 2 3-D,* a big-budget special-venue attraction directed by James Cameron and photographed by Russell Carpenter, ASC (photo by Virgil Mirano, courtesy of Digital Domain).

Contributing Authors:
Rudy Behlmer
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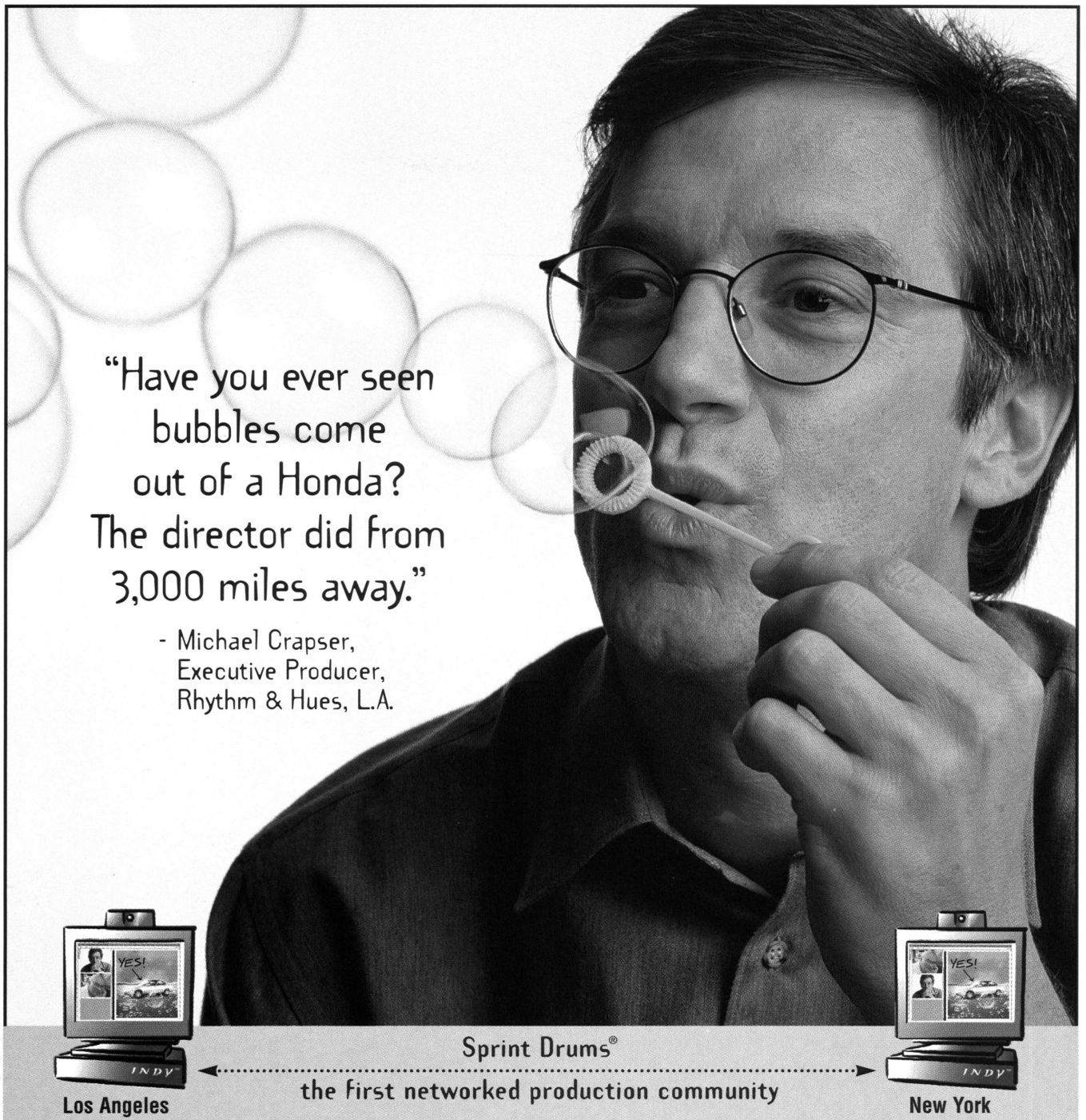

The idea was simple: Take a Honda car with a sunroof, open it up and make bubbles come out of it. Doing it, however, was another matter.

"Henry Sandbank, of Sandbank Films, shot the car first. Our job was to put the bubbles in later," says Michael Crapser, the executive producer at Rhythm & Hues charged with making it work. "But he couldn't be with us in L.A. to help choreograph the bubbles."

Luckily, the team had Drums, an interactive production tool that let them easily send images across the country to each other. In fact, with T-1 connectivity, the team was able to review the work simultaneously on both coasts. "With Drums, we got the director's input while he was in N.Y. and we were in L.A. with Rubin Postaer, the agency that created the spot. We were all able to see the footage at the same time. Nobody ever left home," says Crapser.

"We not only made bubbles come out of a Honda," Crapser adds, "but Henry uncorked it from across the country."

All of which led to a commercial deserving of the bubbly itself.

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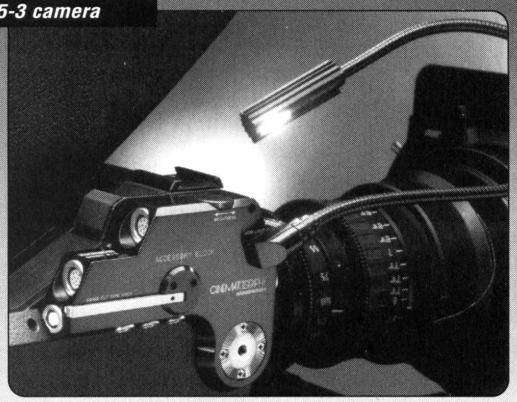

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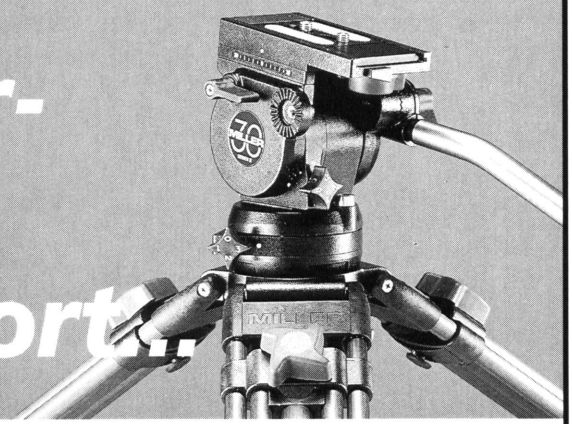

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The American Society of Cinematographers is not a labor union or a guild, but is an educational, cultural and professional organization. Membership is by invitation to those who are actively engaged as directors of photography and have demonstrated outstanding ability. ASC membership has become one of the highest honors that can be bestowed upon a professional cinematographer — a mark of prestige and excellence.

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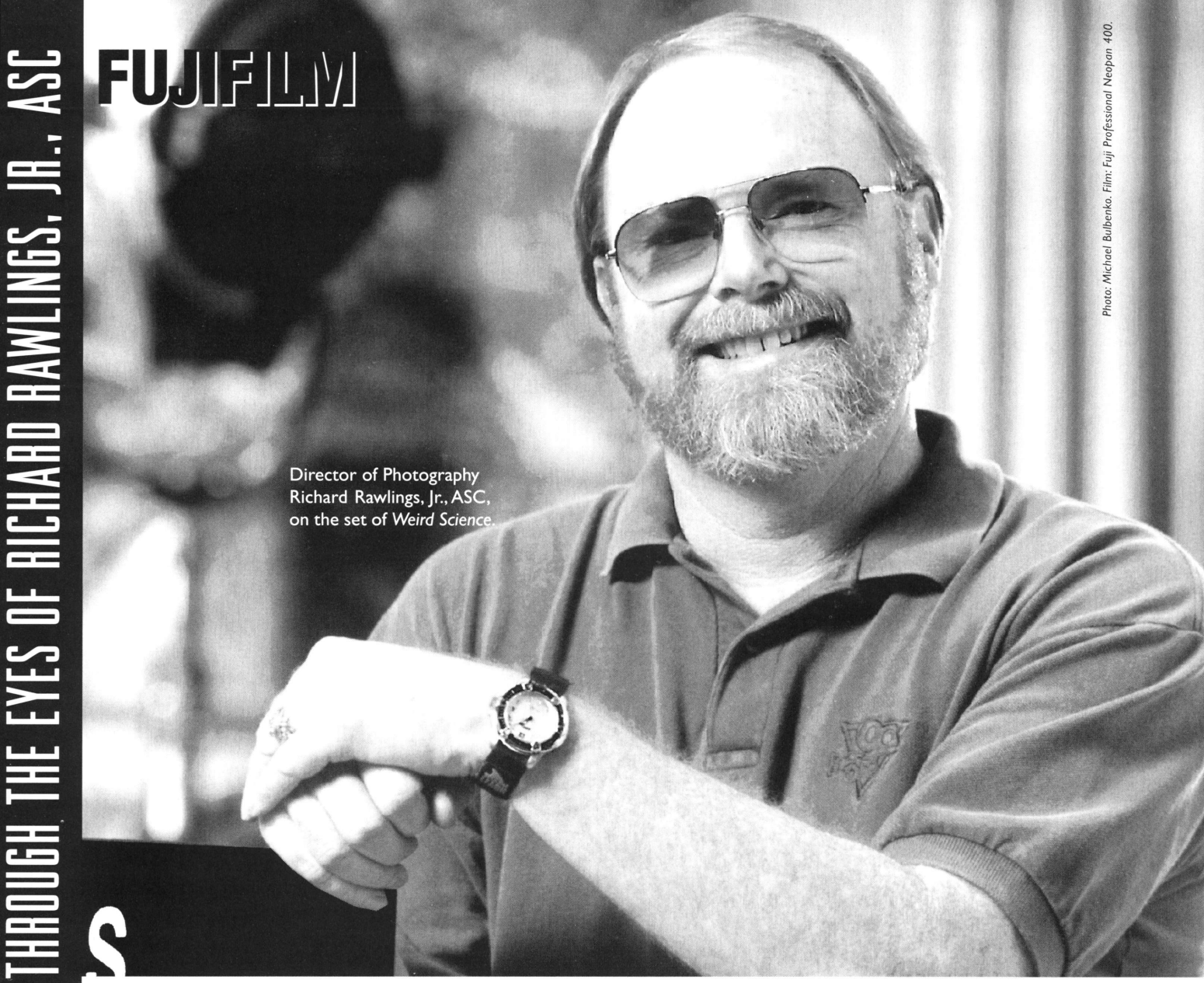

Director of Photography Richard Rawlings, Jr., ASC, on the set of *Weird Science*.

Photo: Michael Bulbenko. Film: Fuji Professional Neopan 400.

WHY IS DICK RAWLINGS POSITIVE ABOUT FUJI NEGATIVE?

"On *Weird Science*, we're aiming for a wildly different look from one episode to the next. It's fun, but it means the stocks have to be flexible enough to handle a wide range of lighting effects. Fuji's Super F-Series is always equal to the task.

"For the many blue screen shots and digital effects the show requires, it's my job to deliver a thick, fine grain neg that can stand up to the manipulation it'll receive in post.

"In one recent script a character encounters his future self. With the help of an elaborate blue screen shot he walks all the way around *himself*. I used Fuji F-500 and the resulting digital composite was totally seamless.

"As a cinematographer working in television, it's great to have choices."

When you see *Weird Science*, you're seeing FUJIFILM.

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How Clairmont sees the Moviecam SL:

Light weight is just the beginning.
This is an excellent *dual-purpose* B camera.
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mode to hand-held or Steadicam mode, so you
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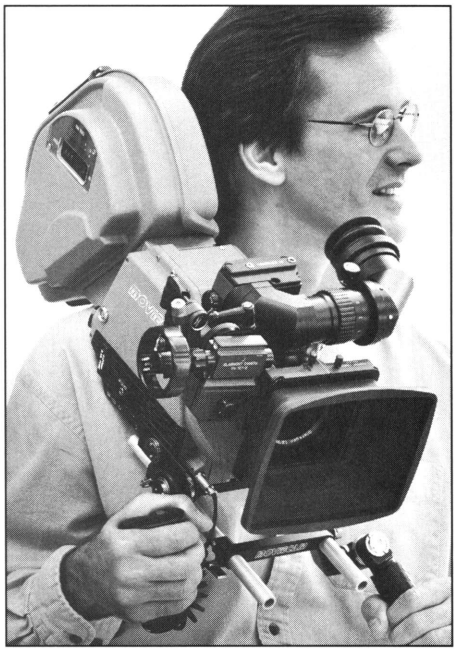

How long does it take to switch an SL from one mode to another? We timed one man making two switches; the results impressed us.

Test results:

At the top of the other page, you can see one of our SLs in full studio mode. At the bottom is an SL in Steadicam mode. We were able to switch from studio to Steadicam in two minutes, four seconds, including film threading.

We asked Moviecam for a 150° shutter setting. Here's what happened:

On the phone with Moviecam designer Fritz Gabriel Bauer, Denny Clairmont mentioned that a 150 degree position on the Compact's adjustable shutter would be useful to people shooting at 25 fps with HMI lights in 60Hz countries. It was said only once — but in our next shipment, there it was, on all the cameras. The SL uses the same *helpful* shutter.

Not long

From studio to hand-held took our man four minutes, ten seconds. Most of the extra time was spent on the left handgrip with its bracket/rods and on the follow-focus.

Not heavy

In hand-held mode, that SL weighed 23 lbs with video tap, hand-held finder, handgrips/rods, Zeiss 35mm T1.3, follow-focus, MB3 mattebox and empty magazine. In Steadicam mode, with video tap, same lens/mattebox and empty magazine, it weighed 17 lb 10 oz.

Same movement

Those are M.O.S. camera weights; but the SL is clearly a sync-sound production camera, in all three modes. It uses the same dual-pin registration movement as the Compact, it has the same adjustable shutter and it can be equipped with the same electronics.

Same accessories

Plug-in accessories provide sync with video monitors and rear projection, speeds from 2 to 40 fps and an iris motor that automatically compensates. With the Compact's viewing module on the SL, you can use the long finder and swing it over. Spherical or anamorphic. Tach and footage counter on both sides. Movieglow.

Rental package

So we see the SL as a dual-purpose B camera — and that's the way we're packaging it. The daily rate is for an SL in its basic hand-held mode. You can mount your 1000 foot Compact magazines. But if you want the Compact's viewing modules and electronics on your SL, you'll rent our studio mode kit.

Customized cost

This way, you rent only as much SL as you need, when you need it. You can customize your SL's weight *and its cost*, from day to day. And you don't need to rent a third camera for hand-held and Steadicam shots.

Extremely quiet

How quiet is the SL? "The Compact was the lightest-weight silent-running camera in the World before the SL came along," says Denny Clairmont. "The Compact is the quietest camera I've ever met and I've met them all. The SL is extremely quiet, but not quite as quiet as the Compact."

Kiss me

Here's the rule of thumb: the SL is quiet enough to shoot anywhere except close in above a love scene where the actors are whispering to each other. For that shot, use your A camera.

In studio mode, above, viewing system and magazine are from Compact. Camera body module weighs 8 lb 6 oz.

Magazines are small because of active displacement.

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Letters

Let's Go Photoshopping

Tomorrow, digital postproduction will be the rule, and this will happen *before* we stop shooting on film. This is good news, as it opens up the infinite possibilities for the alteration of our images: from the flexibility and freedom of digital grading to "cosmetic postproduction," a domain which ranges from the erasing of a simple wrinkle to the complete remodeling of a face.

There is a great danger that in most cases this creative work will elude directors of photography because productions will not pay them for this lengthy task, one which usually happens several months after the end of principal photography. Being obliged to work on other films, they might not be available to do it, even for free. Therefore, they may lose the control of their images.

We need to figure out how cinematographers can still keep control and not be demoted to rank of "raw material providers." Perhaps during prep time, a cinematographer could do digital research (on the texture, contrast, color saturation, etc...) on various still images. These images could come from archives, scanned scouting stills or public, private, and personal collections. The cinematographer would then discuss them with the director so as to obtain a rough model of the finished images. This would allow him/her to start principal photography with a very definite idea of what the film will be at the end, in order to make the right technical choices.

During principal photography, the cinematographer could replace some of these preparatory images with others directly issued from the film being shot. Since a film is a work-in-progress, the cinematographer might want to keep working on these images and then submit them to the director until they both agree upon the result. At the end of principal photography, the cinematographer would then deliver to the postproduction company 10 to 50 or images that come with the "imprimatur" of the director, as they have already been digitally altered.

To achieve this, the cinematographer does not need to have complete mastering of the post-production tool. The idea is not for him/her to become a colorist. As scanning and imaging can be treated "outside," PC-operated software like Photoshop is sufficient to work on the suggested still images. But it is only after doing some homework — learning how to use the software — that the cinematographer will get a precise view of the possibilities of digital tools. Let's go Photoshop now!

— Denis Lenoir, AFC
Glendale, California

Inquires Answered

In reference to Murray Callan's query (Letters, *AC*, February 1996), the Edinburgh footage in *Journey to the Center of the Earth* was shot by a British second unit crew, according to 20th Century Fox expert Aubrey Solomon. His files do not contain the name of the director or cinematographer.

For Roger Brown (Letters, *AC*, February 1996), pan-and-scanning of anamorphic and 65mm films for TV transmission rather than letterboxing was instituted in the mid-Sixties because of an FCC ruling requiring the transmission of a full 1.33 video image. This decree was later revoked in the Eighties. (A form of letterboxing had already been introduced for 16mm non-theatrical prints.) On the earliest films that were syndicated, the credits *as well as* the films themselves were also shot down the middle. Later, a simplified three-position form of pan/scanning was introduced by whomever was preparing prints for Warner Bros. and Columbia. For the record, the first anamorphic films sold to TV were *Gentlemen Marry Brunettes* (1955) and *The Ambassador's Daughter* (1956). Both were included in a package sold by United Artists in 1958.

When 20th Century Fox made its deal with NBC for a package to be shown on the network in 1961, a more refined form of pan/scanning was developed by its engineers and DeLuxe Laboratories in which the credits were usually left squeezed. Later, Universal began letterboxing the credits of its film with a

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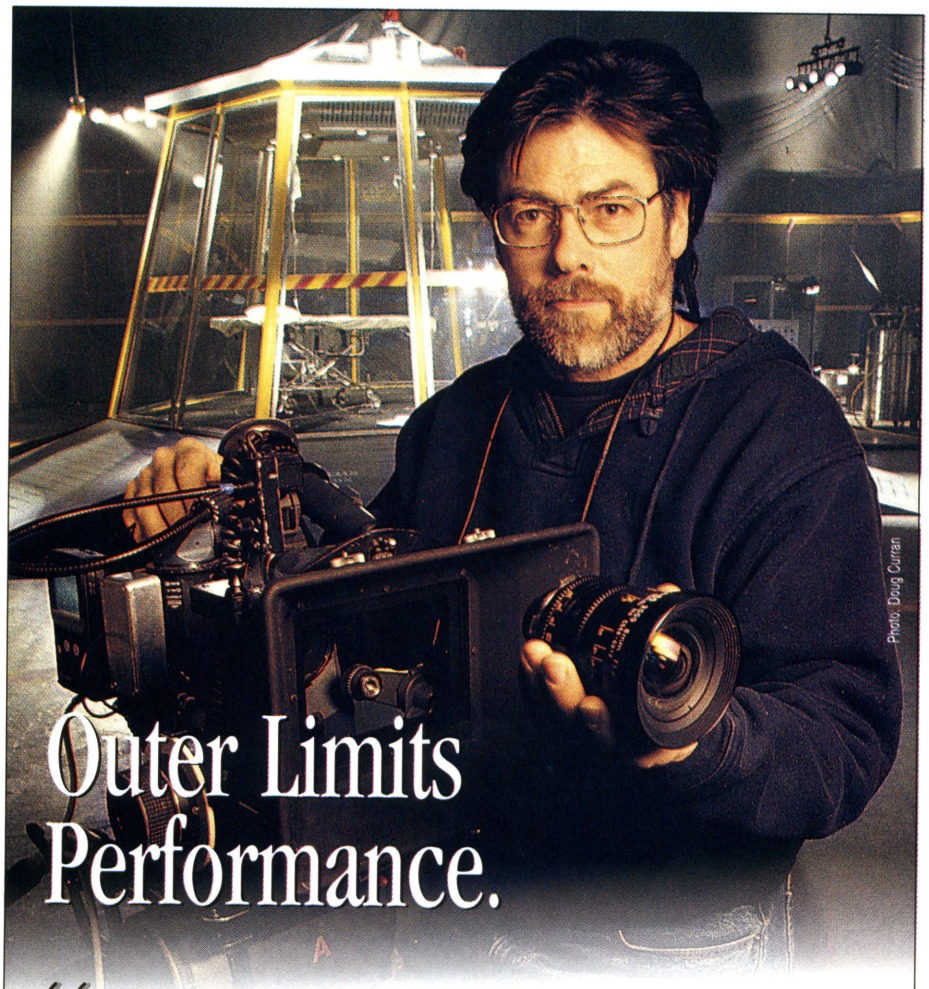

Outer Limits Performance.

Photo: Doug Curran

"*The Outer Limits* is a wide angle show. Among the many challenges associated with shooting super-16, the lack of a good quality wide angle lens that covers the entire negative area was one of my greatest concerns.

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filigree printed into the black at the top and bottom of the frame to conform to the FCC ruling.

In the late Seventies, letterboxing of full features was introduced with the rise of cable and home video. This process, however, was not subject to FCC ruling. It is a controversial issue with some video people, who feel they are being cheated by not getting a full image.

— Rick Mitchell
Los Angeles, California

Austrian Delight

My name in Matthias Greuling. I'm 18 years old, and I have been a reader/subscriber to *American Cinematographer* for about three years now. I know that most of the letters you receive are written by professional filmmakers or by people who work in the industry. I, however, am no professional. I'm just an Austrian student with an interest in the film industry — I hope to one day become a filmmaker. I've written to tell you how brilliant your magazine is. In the past three years, I've learned much about filmmaking, production techniques and digital innovations.

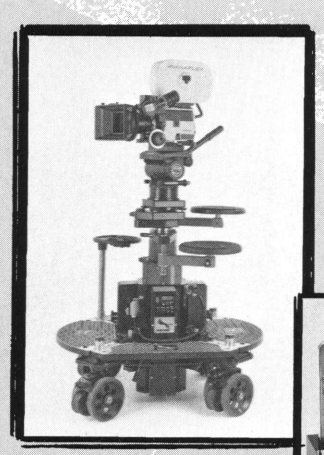
What I liked most about the June issue were the stories about *Mission: Impossible*, *The Rock* and film preservation. The information from your New Products department was also very interesting, as always. I love your magazine, and I think that it will help me to become a director.

— Matthais Greuling
Moedling, Austria

Errata

In Karen Kalish's recent article "Film Preservation: A Practical Guide" (*AC* June 1996), Phil Murphy, vice president of operations for the Paramount Television Group, was mistakenly identified as *Fred* Murphy on page 123. *AC* offers its sincere regrets for this typographical error.

We would also like to add a note concerning the section on "Determining the Archival Quality of Your Negatives" (also on page 123), in which we failed to mention that N.T. Audio can also conduct a 15-minute test to determine the archival quality of black-and-white separation masters. For further information, contact Tom McCormick at N.T. Audio, 1833 Centinela Ave., Santa Monica, CA 90404, (310) 828-1098.



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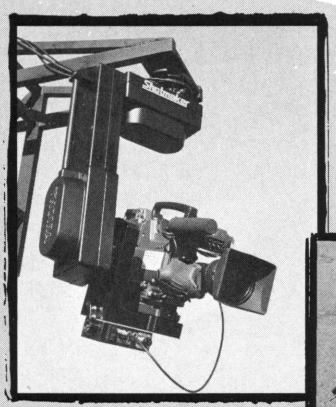

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Archivists Warn: Don't Depend on DAT

by Frank Beacham

In recent years film and video makers have embraced the DAT audio format as a convenient and economical way to record and store high-quality location audio. Now some of the world's leading audio preservationists are warning that tape-based digital recording media — especially DAT — is not reliable for long-term archiving of sound.

During a recent AES panel discussion on digital audio, the archivists urged recording equipment manufacturers to quickly create reliable long-term storage media for analog and digital audio recordings. There was a consensus that, at least for now, analog tape is the only proven, reliable way to preserve sound recordings for the future.

Ironically, one of the most passionate pleas came from Marc Kirkeby, senior director of the American music archives for Sony, a company that is not only a leading manufacturer of digital recording equipment and media, but the owner of more than 600,000 recordings dating back to the turn of the century.

"The potential for disaster out there cannot be overemphasized," said Kirkeby, who noted that most valuable recordings are retrievable today only through blind luck. "We have tapes from 1949 that sound wonderful," he said. "We have tapes from 1989 that are shot to hell. And it's all just chance."

Kirkeby said that now, 15 years into the digital recording era, "it is painfully apparent that there has not been a digital medium introduced that really serves an archival purpose. If you have to go to bed at night wondering if your tapes are going to be there in the morning, that's not an archival medium."

Sony Music, like most other record companies, has no systematic program to preserve aging master recordings, Kirkeby said. "We archive to analog on an as-needed basis and we archive digital-to-digital," he said.

DAT cassettes, said Kirkeby, are especially unpredictable in their reliability. He said he'd bet his pay that analog originals will outlive DATs. "There's always that little moment when you put the thing in the machine," he said. "Is it going to play or not? If you knew that outside of 10 years certain chemistry aspects would start to change, then you could allow for that. But, if you can't predict it, how do you plan? That's my problem with DAT."

Though there were no location sound recordists for film or television on the panel, all the participants use the same equipment and techniques that are employed on visual productions. Virtually all of the panelists cited problems with the DAT format, mostly relating to machine interchange. None recommended the format as an archival medium.

DAT was criticized by John Barnes, a European specialist in operatic archival recording who has used the format at the Glynbebourne Festival Opera in England. "We've had very bad experience with DAT tapes and, in particular, DAT tape housings," he said, estimating that he finds an average of one malfunctioning DAT tape out of every 20 he uses.

"I'm not at all happy about the use of DAT tape as a long-term storage medium and we've got to try to find an alternative," he said. "[There are] far too many failed masters and failed copies using so-called high quality professional grade DAT tapes."

DAT was also maligned by Gerry Gibson, a specialist in electronic media preservation at the Library of Congress and chairman of the AES Audio Preservation Standards Group. "We believe that long term preservation of audio will be digital," said Gibson. "For now, however, our experience is the current digital media and systems are not

experience

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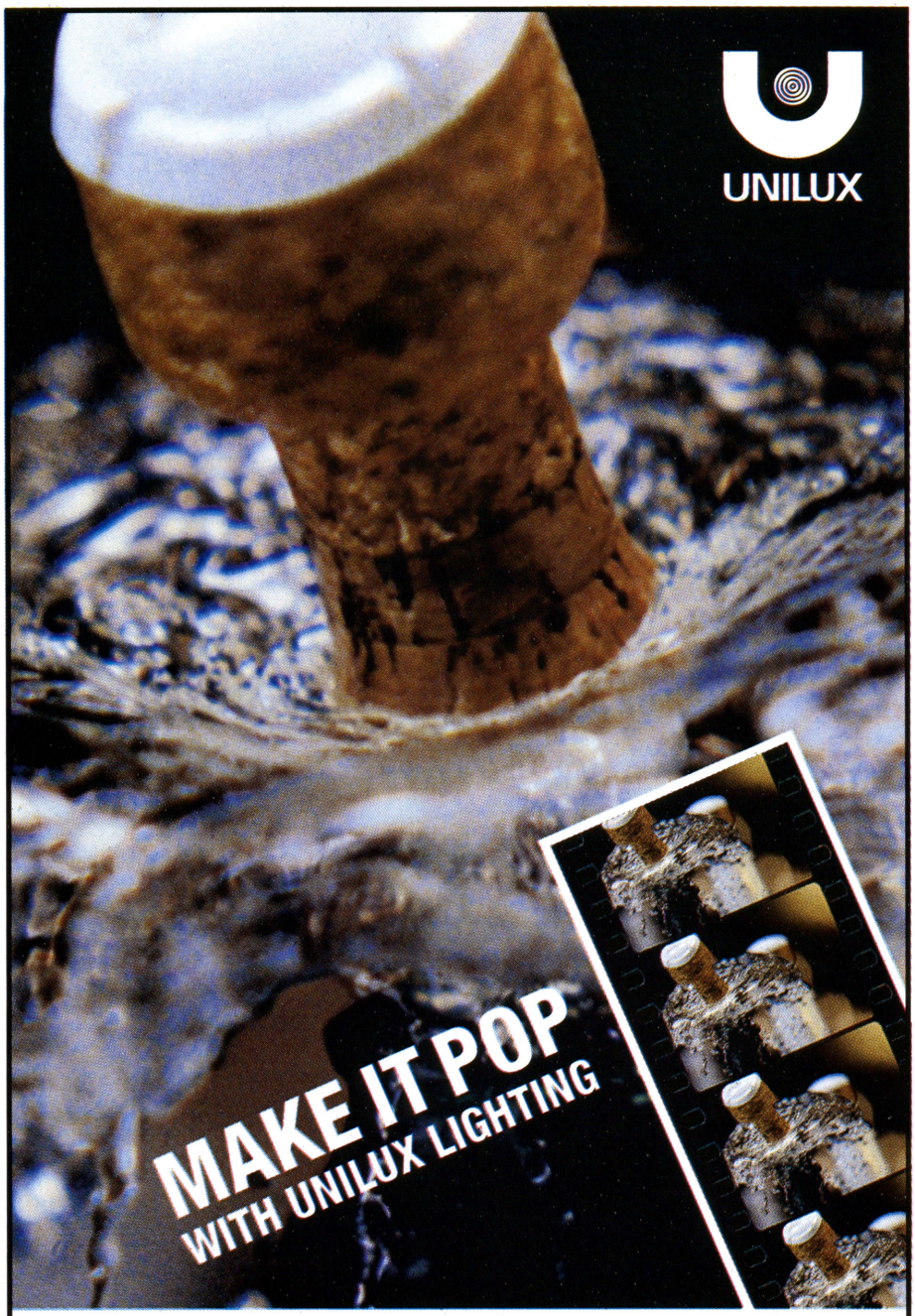

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rent digital media and systems are not appropriate for long-term storage or preservation."

For preservation, said Gibson, the Library of Congress — the largest information collector in the world — depends on half-track, quarter-inch analog audio tape for backing up its over three million sound recordings. "Further, we are very leery of any compression schemes for the long-term storage of preservation masters because of fear that compression means loss of information regardless of how good the algorithm is," he said. "I have reservations, as an archivist and a historian, that I can really rely upon that machine to make the decision as to what's not useful data."

Veteran recording engineer Roger Nichols, who said he's a regular user of DAT himself, warned recordists to treat the digital cassette format as a temporary medium. "Where in archival you are worried about longevity, the DAT tape isn't quite going to make it," he said. "As for a medium for temporarily storing your data, it's [acceptable for] a year or so, but you will eventually transfer [the data] to something else."

Alignment of DAT machines is a major reason for the problems, Nichols said. "If you look at a DAT alignment tape on a machine, there's a DAT standard of plus or minus 10 percent," he said. "You [use] one machine that's 10 percent one way within the DAT standard and you want to play back on another machine that ten percent the other way, but it's not going to [work]. I run into problems all the time with DAT compatibility."

As for alternative digital storage media for preservation, several panelists said they are currently investigating alternative possibilities. The recordable CD format — CD-R — is most promising so far, they said.

"We tried CD-R for the first time this year and have been very happy with it," said Barnes. "The only problem at the moment is recording length. Seventy-four minutes is too short. We need something in excess of 120 minutes."

Audio recordists, said Sony's Kirkeby, need desperately to get beyond their dependence on "the medium of the moment" and find a digital audio backup system that offers long-term stability. ◆

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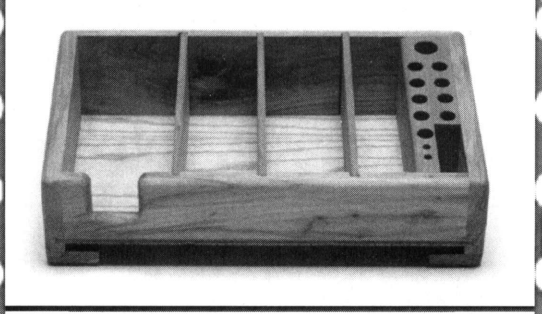

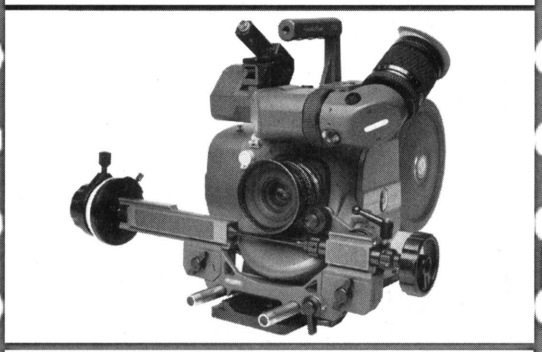

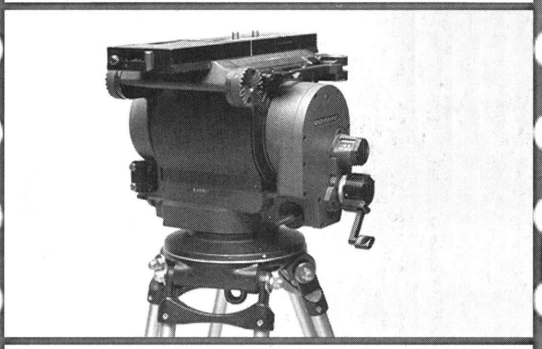

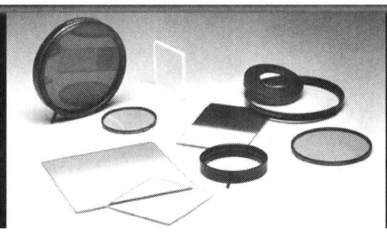

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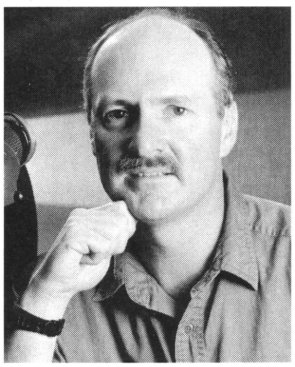
So for the past six months, a dozen new Arriflex 435's were tested around the world, by experienced cinematographers, under very demanding conditions. Bill Bennett, one of those cinematographers, put the 435 camera system through a variety of challenging commercial shoots. The results were very positive to say the least. Here is Bill's story.



"This camera is rugged.

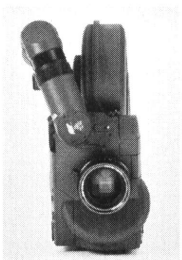
The 435 was hit by a car and knocked onto the sidewalk but we were able to continue shooting. Obviously, the camera body and internal components are extremely rugged."
William Bennett, *DP*

"Over a period of two months, I used the 435 ES on six commercial productions all around the US. I encountered many of the usual adverse conditions – rain, dust, cold, heat – you name it. But through it all the 435 performed flawlessly.

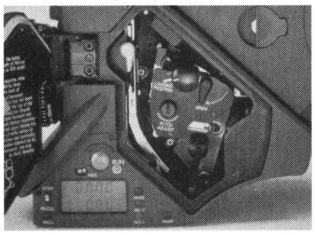
"On one shoot, the 435 camera system was mounted on a tripod for a stunt scene in downtown Los Angeles when it was accidentally struck by a car. The camera fell five feet, crashed onto the concrete sidewalk and slid twelve more feet.

"The mattebox was destroyed, but the only damage to the camera was a slight crack in the magazine! We replaced it with an Arriflex 35-3 type magazine and shot the rest of the night. All the footage, before and after the accident, was perfect!

"The day after the accident we tested the steadiness of the movement against a latent-image grid, pre-exposed on an optical printer using an Acme camera with a Bell and Howell 7709 type, fixed-registration pin movement. We took this latent-image film and exposed it a second time in the 435 ES with the grid rotated about 10°, so the two sets of grid lines would cross each other on the negative. Using a new 435 type magazine, we ran the camera at: 12, 24, 30 and 150 fps with a 180° shutter. In all cases the image was rock steady!"

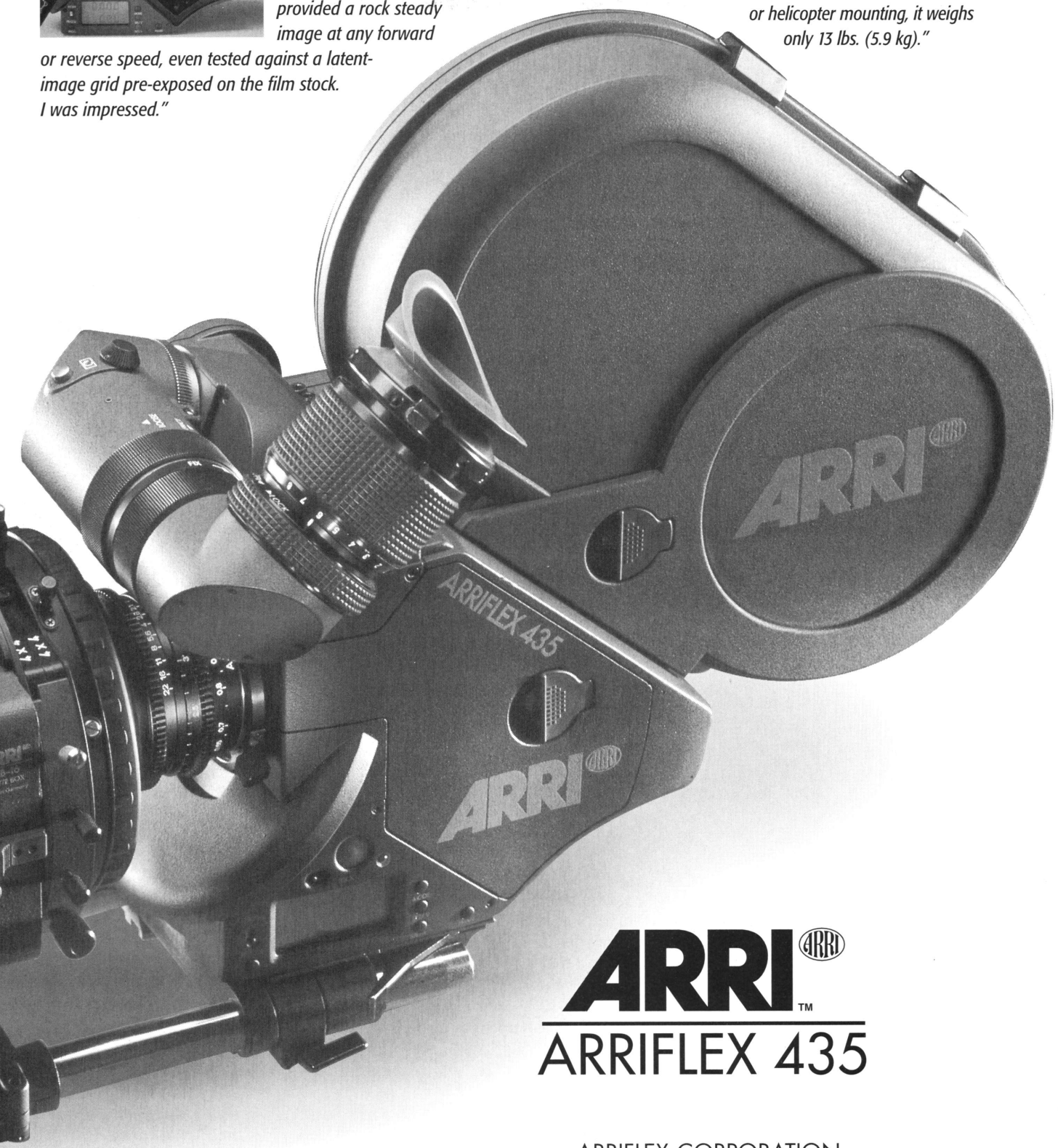


"The viewfinder is very bright and sharp...
even with video installed. The ability to re-orient the viewfinder and rotate the image to a position other than the detent is very useful. In awkward and unusual camera positions where I have to look through the viewfinder, I wouldn't be without it."



"The image is rock steady. *The 5 link movement with two registration and six transport pins provided a rock steady image at any forward or reverse speed, even tested against a latent-image grid pre-exposed on the film stock. I was impressed."*

"It's a good ergonomic piece of equipment. *The 435 camera system is very compact and light-weight. Even though it has a lot of additional features, its standard weight is less than that of the 35-3. With the 100% video top for SteadiCam or helicopter mounting, it weighs only 13 lbs. (5.9 kg)."*



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Aliens Invade Special Venue; Filmmakers Scale Everest; Digital Domain Hosts Cinematographers; Effects Add Zap to *The Arrival*

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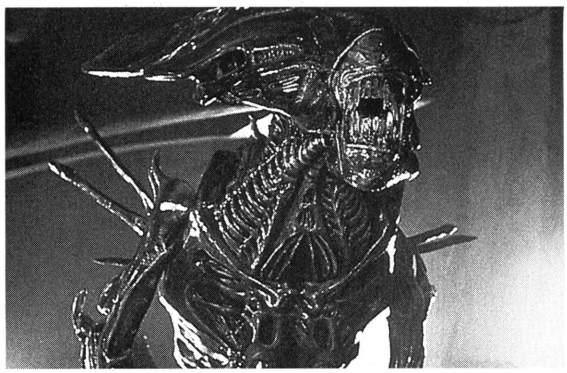

The xenomorph Queen, as seen in 1986's* Aliens, *plays a key role in the Praxis/ Iwerks presentation.

Aliens: Ride at the Speed Of Fright

Produced by Praxis Films in association with Iwerks Entertainment (which previously produced *RoboCop: The Ride*), *Aliens: Ride at the Speed of Fright* debuted earlier this year at San Francisco's Pier 39, as well as three theaters in Japan. The attraction features effects scenes from James Cameron's *Aliens,* along with new footage created specifically for the ride. It was directed by Stuart Gordon *(Re-Animator)* and shot by Paul Gentry, a former effects supervisor at Full Moon Entertainment.

The ridefilm's pre-show opens with the discovery of a distraught marine who apparently is the sole survivor of an alien attack. Through flashbacks, we experience his squad's routine survey of the planet's colony, where the marines find scattered corpses smeared with alien secretions. The squad resolves to trigger a bomb that will decimate the planet's surface in 10 hours.

As the members of the squad attempt to plant the bomb in a tunnel, they are ambushed by aliens from all directions. Firing back, the marines attempt to flee, but the tunnel becomes clogged with debris. As the awful details of the survivor's story sink in, the marines interrogating him realize that some of his squad may still be alive in the obstructed passageway. With time running out on the ticking bomb, the marines board an APC (Armored Personnel Carrier), steering it into a dropship which embarks on a rescue mission to Hell.

Footage from *Aliens* shows the APC descending to the planet. Viewers then witness a point-of-view image on the screen, in which the tank barrels through the desolate, debris-littered complex. Each level of the ascent reveals huge holes formed by acidic alien blood — one of which nearly swallows the tank. Following a faint distress signal, the marines find the wreckage of the other APC and start dragging wounded men from the rubble.

With only two minutes left until the bomb explodes and aliens attacking from every direction, the tank plummets through four levels of acid-eaten floors of ever-diminishing circumference. The APC's final resting place is a darkened egg chamber guarded by the giant Alien Queen.

Iwerks' ride simulation theaters synchronize giant high-resolution movie images with high-tech motion bases. Gentry photographed the new material on 35mm 5248, optically enlarged to Iwerks' large-format 870 film (8-perforation 70mm film), a frame half the size of the Imax format. A VistaVision camera was chosen to capture the images because a standard 8-perf 65mm camera would have been too bulky to use within the confines of miniature sets. While the aspect ratios of the two formats are similar, some side information is lost in the VistaVision frame.

The sets themselves consisted of life-sized props and miniatures. No computer-generated effects were used in the film, as previous Iwerks ridefilms that relied on CGI tended to lose realism when blown up on large-theater projection screens. Thus, miniatures were chosen to create a more believable appearance. The sets were designed by artists who worked on Cameron's *Aliens*; the largely British crew used everything from *Alien* model kits to conduit flex to dress the sets, and designer H.R. Giger's *Alien* book (chronicling the creature's evolution and creation for the original 1979 film) was used as reference material. One trench set was redressed for each level the APC lumbers into.

In order for the camera to navigate the tight confines of the 40'-long miniature trench, a snorkel lens was mounted to the motion-control rig. As the operator, I programmed as many as 16 channels of axis movement into the computer using Kuper RTMC130 software. Motion-control makes up half of the four-minute ride, with some continuous shots lasting as long as 40 seconds. As the camera rounded corners or plowed through debris, optical wipes provided transitions to each level of the trench.

A searchlight above the tank was operated by stepper motors and programmed into the shot via live encoder pan-and-tilt controllers. Flickering lights and interactive spark lights — used when the tank scraped against a wall — were programmed using the new DAC (digital-to-analog conversion) feature in the Kuper. The levels of these lights, along with practical stage lighting on the set, could be raised and lowered for each axis as a means of fading in or out at any given frame number. This proved invaluable for Gentry when lighting the intricate set; since ceilings had to be removed to permit access for the periscope lens, a given light could be faded once the camera passed.

The entire sequence took more than a month to shoot. More than a week was needed to build, light, program, shoot, and re-shoot the first motion-control shot. To keep the long trench in focus, the wide-angle 16mm Nikon lens had to be reduced in stop to f16. Thus, the low footcandle levels required the

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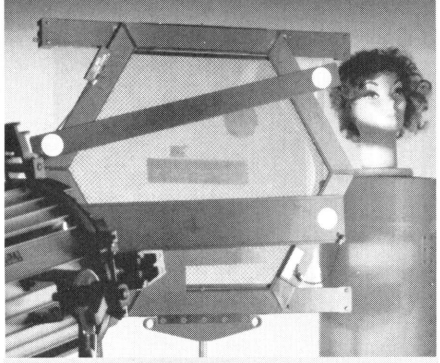

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camera to shoot at exposure rates as slow as 10 seconds per frame. This meant that a 40-second shot consisting of 1,200 frames might take as long as seven hours to shoot. The Kuper has a synthetic shutter option whereby the operator can fool the camera into turning faster when the shutter is closed, thereby increasing motion blur in the open position.

Once a move was completed, a video camera recorded the action onto a Personal Animation Recorder for the PC. This could then be played back at real time to effect any changes to the camera move. After a move was approved, a videotape of it was sent to Iwerks, where a technician programmed a movable hydraulic chair (similar to those occupied by the audience) to match the bumps in the move. This would help ensure that the bumps and jolts were consistent with the onscreen images. The camera move was then altered and the process began all over again. Certain moves, such as sideways skids, were avoided because Iwerks chairs do not accommodate lateral movement.

The lighting was initially murky and mysterious. Rays of light cast spectacular patterns from the ceilings, which were fashioned out of forklift crates. The producers, however, wanted the set to be brighter so that those riding the attraction could anticipate the perils lying ahead. As ceiling removals would have changed the lighting during the shot, top lighting had to be kept to a minimum; side lighting and ambient lights were chosen instead. A small fluorescent fixture mounted on the camera below the Dedo searchlight provided some up-close visibility. The spotlight cut interesting cones of light in the dense smoke. To accurately assess the smoke level throughout the lengthy takes, a light meter was attached to a C-stand and focused on a lamp. Bumps were exaggerated onscreen, yet quick jolts were kept to a minimum since the giant 8-perf image would move a considerable distance in front of the viewer.

Due to the tight budget, the entire production (which began shooting in February of last year) was kept under wraps because the filmmakers did not want outside influences to affect their work. Neither Giger nor Cameron were contacted about the ridefilm. When told of the project, Giger said, "I'm glad they're doing it, but I would like to be informed." Perhaps Giger will take a spin on it one day and finally experience the true horror of his otherworldly creation.

— Les Paul Robley

Film Crew Reaches Everest's Summit

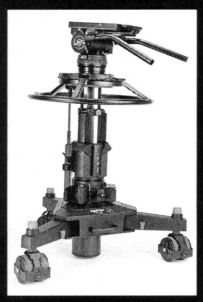
After thorough preparations, a MacGillivray-Freeman Films/Arcturus Motion Pictures climbing and film production team reached the 29,028-foot summit of Mt. Everest on May 23 [see earlier coverage in *AC* Aug. '95]. Cinematographer David Breashears was equipped with a 35-pound Imax MK II Lightweight camera powered by a special lithium cell battery. He shot 2 ½ minutes of 15 perf/65mm footage for the 40-minute film *Everest,* which is scheduled for release in Imax and Iwerks theaters early in 1998.

Says an elated Breashears, "The thought of seeing the Himalayas projected 50 to 60 feet high is what kept me going. For the first time we're able to give audiences a real honest-to-goodness feeling of what it's like to be struggling for every breath at 26,000 feet."

Joining Breashears on the summit were expert mountaineer and filmmaker Robert Schauer of Graz, Austria; America's foremost Himalayan mountaineer, Ed Viesturs of Seattle; Jamling Tenzing Norgay of Darjeeling (son of Tenzing Norgay, who made the historic 1953 ascent with Sir Edmund Hillary); expert rock and ice climber Araceli Segarra Roca, the first Spanish woman to reach Everest's peak; Sweden's Goran Kropp; Lakpha Dorje Sherpa, leader of the indigenous Sherpas; a team of four Sherpa camera and climbing assistants; and Sherpa Ang Rita, who has now completed a record-breaking 10 climbs of Everest.

Everest will focus on the geology of the Himalayas. The team has installed a weather station at the South Col (a camp some 3,000 feet below the summit), and a Global Positioning Receiver that may provide data to advance the understanding of the geologic forces that cause earthquakes in this region. This solar-powered unit will provide data on high mountain weather and help guide future climbing teams.

Filming of *Everest* will continue through early 1997. It will be the 19th large-format project from MacGillivray-Freeman Films in the past 25 years. Their other productions include



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ASC and Digital Domain Explore New Frontiers

During the late Eighties, James Cameron was one of only a few directors exploring the convergence of film and computer technologies. For pivotal scenes in *The Abyss*, he wanted to integrate a believable water creature (a pseudopod), which he envisioned as a snake-like projection constantly undulating with a random rippling effect. Industrial Light & Magic translated that vision into photo-realistic reality. That was in 1988, a time when the digital revolution had only made plodding progress since the production of *Tron* (1982) and *The Last Starfighter* (1984). After *The Abyss'* effects earned an Academy Award, even a Luddite could predict that the integration of computers was the next evolutionary step in the filmmaking process. A mere two years later, however, the evolution became a revolution when viewers saw Cameron's innovative use of CGI, morphing and digital compositing in *Terminator 2: Judgment Day.*

In 1992, Scott Ross, then-manager of ILM, decided to establish a facility that would give him a freer hand to realize his *own* vision for the convergence of film and digital technologies. Cameron, who had worked with Ross previously, joined in on the partnership along with effects expert Stan Winston. The team's company, Digital Domain, has since handled visual effects for Cameron's *True Lies,* as well as *Interview with the Vampire* and *Apollo 13.* It has also made successful forays into the ridefilm, multimedia and TV commercial arenas. (See related story on page 38.)

In March, Digital Domain suggested a meeting between ASC members and some of their key department heads in order to bridge the perceived "communications gap" between cinematographers and "digital artists." The latter appellation is a euphemism for two categories of computer workstation operators: those who create 3-D computer-generated images, including objects, environments and characters; and those who work in 2-D computer space to composite elements of scenes and perform other image processing applications such as wire- and object-removal or picture-enhancement through the alteration of color, contrast and grain.

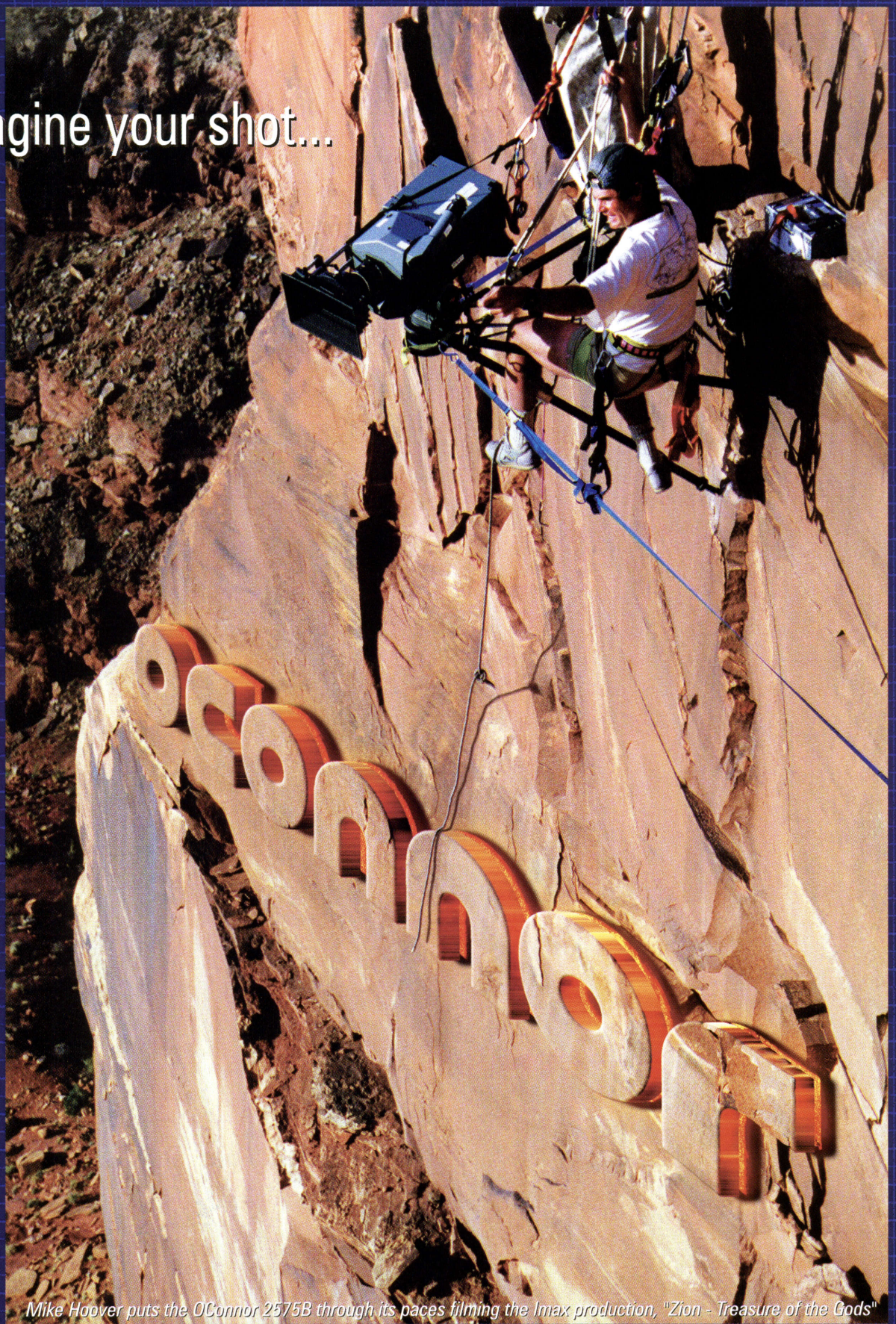
The first meeting included such digitally literate cinematographers as ASC members Robert Primes, Mikael Salomon, Allen Daviau, John Toll and Curtis Clark. All of them brought years of digital postproduction experience in the TV commercial realm to the table, and several have already applied their computer expertise to the big screen. (For example, Salomon, who shot *The Abyss,* is currently directing the effects-laden film *The Flood* for Paramount Pictures.) The contingency from Digital Domain included visual effects supervisor Rob Legato, vice-president and creative director Price Pethel, motion-capture manager Andre Bustanoby, head of technology Wook, director of feature marketing Deborah Giarratana, and public relations director Bob Hoffman.

That meeting set the stage for a day-long seminar on May 4 at the Digital Domain headquarters in Venice, California. The ASC contingent for this gathering also included Roger Deakins, Stephen Burum and Haskell Wexler. Approximately 90 people from Digital Domain attended the Saturday morning session, including virtually all of the company's digital artists.

Ross set the tone by asking a rhetorical question. "Wouldn't it be wonderful if cinematographers could work with our digital artists to manipulate the quality of images in postproduction? Producers aren't used to involving cinematographers in postproduction except for color timing, but it is time for them to rethink the process that we use to create computer images on film."

The seminar opened with Daviau discussing his approach to lighting. Deakins followed by filming a simulated scene and detailing its aesthetic motivations. Both aimed to help digital artists visualize the methods and motivations of the cinematographic process. Daviau explained that the angle, direction, color and intensity of light are all designed to give the audience a sense of time, place and prevailing mood. He pointed out why certain images are diffused, why specific colors are deeply saturated, and how texture (including grain), lens choice, shot composition, camera movement and frame rate all contribute to artistic decisions.

Daviau also noted that it's not unusual for cinematographers and directors to improvise at the moment of photography, since they are reacting to the



Mike Hoover puts the OConnor 2575B through its paces filming the Imax production, "Zion - Treasure of the Gods"

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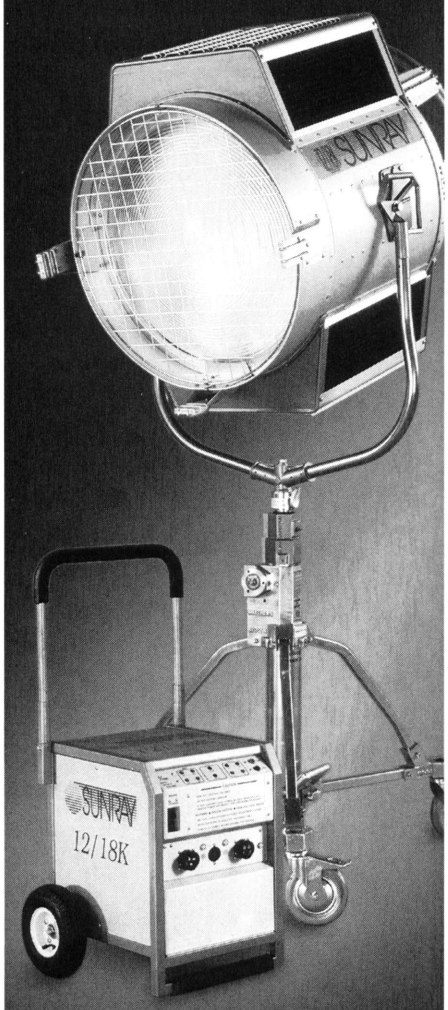

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way light is falling and how the actors are responding to the environment and each other. He then demonstrated how he might light a night interior scene motivated by practical lights, and also how he would deal with a daytime scene in the same setting with the main light shining through the window. His options were to choose a film that records softer images without filtration, or a faster film to capture a wider range of contrast and more vibrant images.

"These decisions are dictated by how the scene speaks to you," Daviau noted. "If the director wants to create a disturbing setting, that affects how we light and block the scene, move the camera and compose the shot."

Next, Deakins set up a difficult lighting situation in a long tunnel left over from an earlier film. As for its design, he says, "This is an instinctive, organic kind of process. There might be changes [in the lighting] up until the minute we turn the camera on. We might move a bounce card or add a kicker because something has changed. Without that spontaneity, the images look and feel antiseptic."

During the afternoon, some of Digital Domain's wares were demonstrated by senior staff members Pethel, Mike Kanfer, Gray Marshall, Doug Roble, Daryll Strauss, Mark Lasoff, Kevin Mack and Dan Ma. Topics included film scanning and recording, motion tracking and motion-control camerawork for an accurate compositing of film elements captured by mobile cameras, 3-D image creation, compositing live-action and computer animation, and lighting and shading images in computer space.

Pethel noted that some film executives hold the false belief that the computer will render cinematographers, art directors, set designers, costume designers, property departments, location scouts and managers and a range of other artists and craftsmen obsolete. In this prospective scenario, actors would ostensibly be filmed in front of green- or bluescreen backgrounds and then composited into CGI environments. Artistic lighting and other creative fine-tuning would be done by the computer artists.

But Pethel believes that such a future is unlikely, and noted that during the earliest days of the Hollywood studio system, virtually all movies were filmed on contrived sets on soundstages or backlots. The trend towards location productions was fueled by a desire for greater realism and spontaneity. Thus, the digital backlot would be a tacit return to the old studio system.

"Would a movie like *Leaving Las Vegas* be better if they never went on location and just filmed everyone in front of a blue- or greenscreen background?" he asked. "That's a very naive point of view. If you've ever tried to do anything that way, you realize how constrained you are. You can't compare that to what Jim Cameron does. He uses technology to create environments that don't exist in reality. Digital effects are merely an extension of the filmmaking process."

— Bob Fisher

PDI's Animation and Effects Enhance *The Arrival*

The recent summer sci-fi thriller *The Arrival* tells the tale of Zane Zaminsky (Charlie Sheen), a scientist who, while searching for intelligent life in the universe, has a very close encounter with hostile aliens. Zamisky uncovers an alien culture at work in Mexico, altering the Earth's climate to make it suitable for themselves. The aliens are speeding up the process of global warming here on Earth, threatening the health of the planet and life as we know it.

In conceiving the look of the alien creatures, writer-director David Twohy (whose previous writing credits include *The Fugitive, Waterworld* and *Alien*^{3}), says, "I started out with the idea of a coppery creature with a partial exoskeleton. I had a picture of beings with back-bending legs and later we added skull flaps, which might have developed to fan their overworked brains."

The production's visual supervisor, Chuck Finance, adds, "We wanted the freedom to stretch or change the shape of the aliens, to do structural things you couldn't do with a person in a rubber suit."

Creation of the creatures was entrusted to computer animation studio Pacific Data Images. PDI had previously used their proprietary human animation system on one of the industry's first "digital stunt doubles" for *Batman Forever*. This system was refined on *The Arrival* to produce the aliens' musculature, skin and other lifelike attributes.

PDI animators first built a computerized skeleton model with backwards-joined legs, hoof-like feet and the

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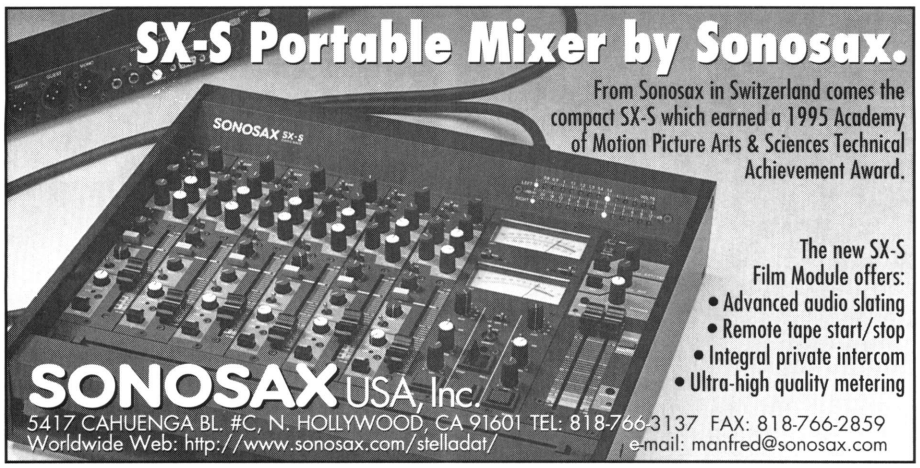

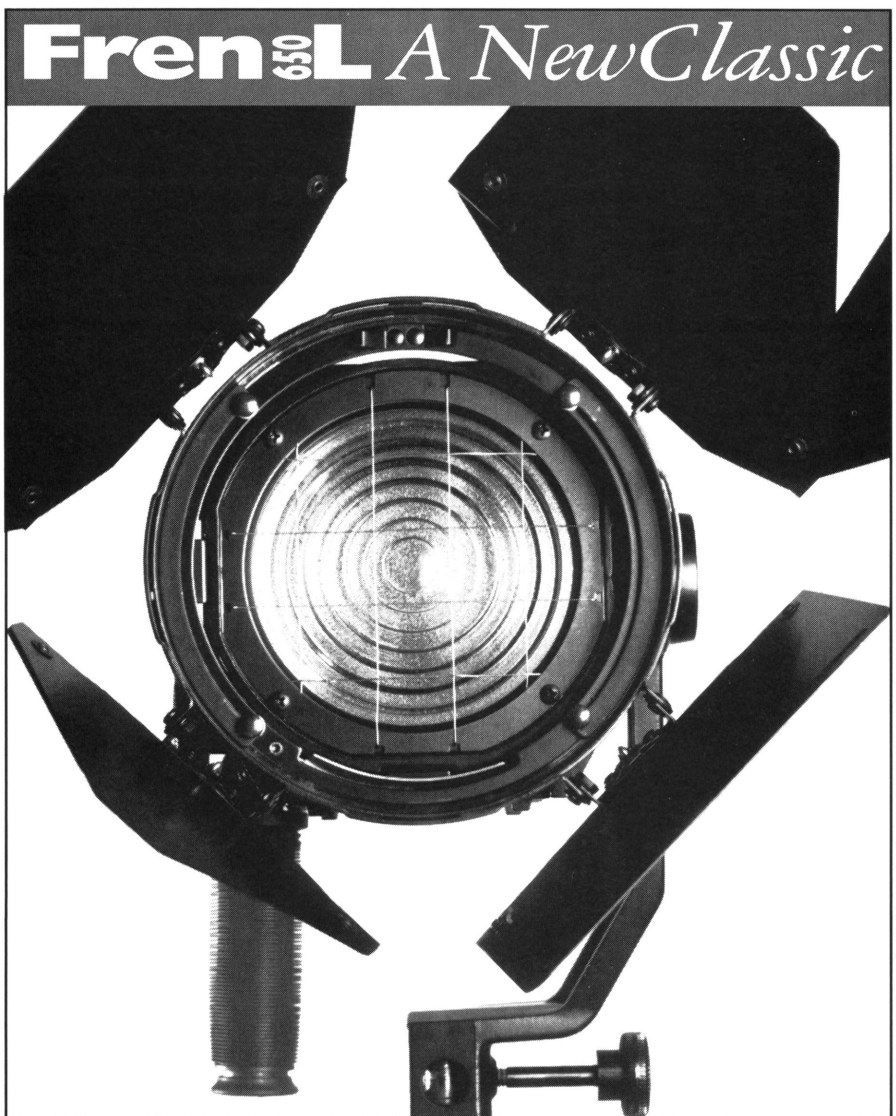

skull flaps. The skeleton was outfitted with a complete set of muscles, and a continuous skin texture was also added to the muscles' surface. The animation system was then used to move the creatures in an anatomically correct fashion. This allowed PDI animators to create subtle performances without the benefit of motion-capture, using hand-animation techniques.

While PDI animators were at work creating the alien model in their Northern California studio, PDI animation director Raman Hui, technical director Paul Wang and CG lighting designer Jean Cunningham supervised location shooting to assure that the digital creatures would integrate flawlessly into the live action. "We wanted to let them have as much freedom of movement with the camera as possible," says Hui. "We took a lot of detailed measurements on the set in order to match camera moves in the computer. We also shot lighting reference footage using stand-in models, with particular emphasis on how shadows would be cast when integrating the digital aliens into the plate photography."

In addition to human animation techniques, *The Arrival* was a proving ground for PDI's CG lighting designers. Zaminsky encounters the aliens for the first time in a pivotal scene that depicts the "terraform factory," a cavernous, underground habitat where the aliens work undisguised. This environment was shot on miniature and full-scale model sets, in very low lighting conditions by cinematographer Hiro Narita, ASC *(James and the Giant Peach, Star Trek VI)*. PDI employed interactive lighting techniques to match and enhance the illumination on-set, including synchronizing lights that flashed in the background with CG lighting on the digital aliens. PDI placed additional CG lights to highlight details of the aliens' performance.

Although the aliens were originally conceived as being copper in color, PDI lighting designers added veins, bumpiness and blue splotchy areas to their skin surfaces in order to give the creatures a more organic look. Accurate lighting of the computer-generated aliens, and the addition of details that mimic film grain, fog, blooming highlights and other naturally occuring effects, also helped to establish the believability of the aliens. ◆

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Amazing *Special Effects*

NOVA's 70mm celebration of movie magic includes re-creations of classic scenes from *Star Wars* and a cameo appearance by King Kong.

by Ron Magid

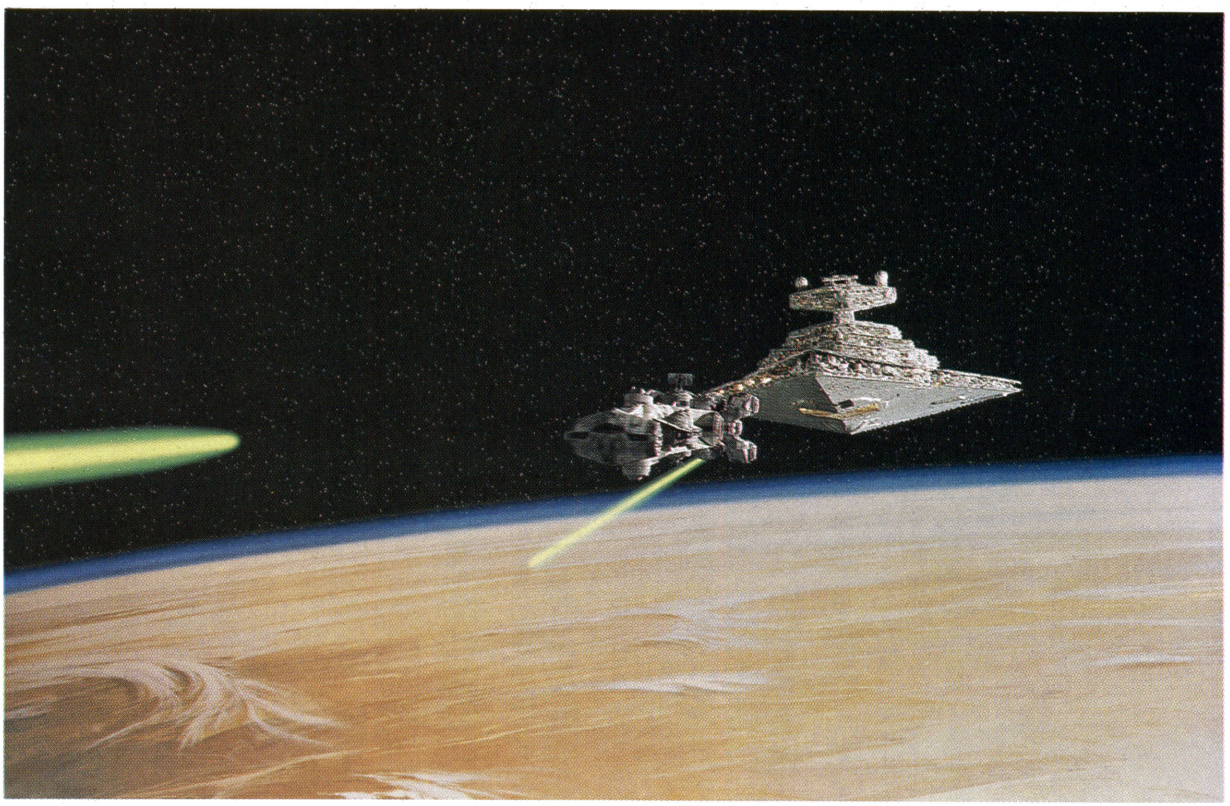
IN THE DIGITAL ERA, SPECIAL EFFECTS have become as omnipresent as sound in most motion pictures. Both the effects artist and the sound designer manipulate our perceptions, creating illusions that enable audiences to see and hear things that did not exist when a scene was originally filmed.

In the fantasy genre in particular, effects cannot exist without the accompaniment of brilliant sound design. Viewing a silent *Star Wars* is not nearly as overwhelming an experience. "I realized that many years ago!" laughs Ben Burtt, a four-time Oscar-winning sound designer (*Star Wars, E.T., Raiders of the Lost Ark* and *Indiana Jones and the Last Crusade*), and the director of *Special Effects*, NOVA/WGBH Boston's latest large-format production to be distributed by Imax Corporation.

The idea for the project originated seven years ago with Susanne Simpson, executive producer of NOVA's Large Format Films. Her original concept was to recreate the tower-climbing climax of *King Kong* with digital techniques. But when that idea proved too expensive, she brought on Burtt as the director. With co-producer Laurel Ladevich, the pair soon took a different approach, which would include an overview of special effects history, detailed looks at the techniques currently used in Hollywood feature films, and re-creations of landmark effects scenes.

Burtt, who served as the principal director on the Imax film *Blue Planet* and co-director on *Destiny in Space*, as well as director/editor/writer on several *Young Indiana Jones* TV episodes, became fascinated with effects work when he first saw 1933's *King Kong*. He details, "It was the first big effects-based commercial success and certainly the first film with an articulate, detailed fantasy soundtrack, setting the pattern we're still following today. I admired [sound designer] Murray Spivack; he was an icon in the business, and his use of sound on *Kong* was a big step forward — nobody had done anything quite like that before."

Given the similarities in the two men's careers, it's not surprising that *Special Effects* opens with a dynamic update of the *King Kong* story. The sequence begins



An Imperial Star Destroyer closes in on a Rebel Blockade Runner in a 70mm re-creation of the opening scene of* Star Wars. *While the Blockade Runner was the original model used in the 1977 film, the Destroyer was a larger, more detailed version built for* The Empire Strikes Back *(1980). Ralph McQuarrie's original matte painting of Tatooine was also retrieved from the LucasFilm Archives for the sequence, which was digitally composited with a CG starfield and laser blasts.

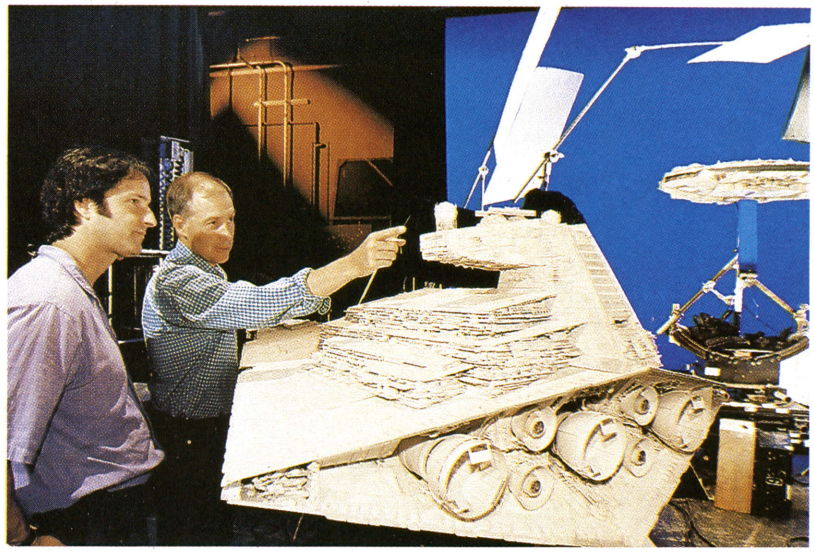
Photos by Peter Iovino and Sean M. Casey, courtesy of WGBH Educationalk Foundation and Lucasfilm Ltd.

with a 35mm black-and-white clip of costars Robert Armstrong and Bruce Cabot observing Kong's fateful skyscraper climb and arguing over what to do next. They exclaim, "Let's send airplanes!" and the image widens to giant-screen proportions, blooming into full color as biplanes streak out of the sky. But this time around, the Eighth Wonder of The World is scaling the heights of downtown San Francisco, making his final stand high above the Bay Area.

Animated by master stop-motionist David Allen, who previously re-created the great ape for a 1972 Volkswagen commercial, this latest incarnation of Kong overcame numerous technical hurdles to bring puppet animation to the demanding large-format arena. "So much of special effects is Impressionism," Burtt explains, "but creating impressions for such a huge screen is much harder. Our images were subject to such magnification and sharpness that we feared audiences would suddenly become aware of the imperfections. The medium asks us to see things — even special effects — for what they really are, and that's tough."

Burtt and Sean MacLeod Phillips, second-unit director of visual effects for the Kong sequences, found it extremely difficult to fashion a successful "impression" of the colossal ape amid a model cityscape for the large-format canvas. A bit burlier than previous versions, Allen's simian performer (dubbed "the Schwarzenegger Kong" by Burtt) was an 18"-high metal armature covered with foam-rubber and fur; his San Francisco domain was a 1/24-scale model, measuring 80' wide by 50' deep by 40' tall. It filled The Chandler Group's motion-control stage and was backed by a graduated night-time scenic that spanned the entire area of the stage.

Bill Kent programmed the the motion-control moves, and Bryan Pass digitally recorded several tests via videotap with the Kong puppet standing in. Phillips then cut the move tests into sequence using an on-set digital editing system. Once he was satisfied with the look, Phillips shot full-resolution move tests sans smoke in 65mm 15-perf; Simpson, Burtt and Phillips then studied the images at Imax theaters in Los Angeles and San Diego to determine if Kong appeared large enough, and whether the ape's moves strobed. Phillips happens to be one of the few 70mm veterans. For 1991's *Ring of Fire,* he supervised a mostly illustrative computer graphics (CG) volcano sequence and composited photographic images to create a primordial earth.



Director Ben Burtt points out a detail on the 8' Star Destroyer model. To achieve the necessary depth for the famous fly-over shot, a 50mm Hasselblad lens stopped down to f45 was used with a Pioneer 65mm 15-perf camera. 5248 was used for crystal-clear sharpness, requiring exposure times of five to six seconds per frame.

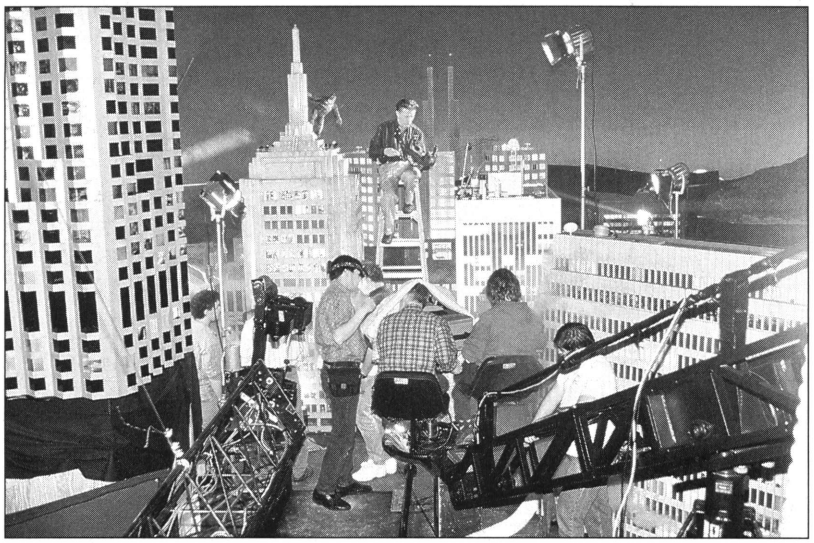
The extreme clarity of 70mm 15-perf images almost sounded the death knell for this sequence. To make Kong's miniature environment appear "real" on the 50' x 80' Imax theater screen, the stage was smoked before each take to create the illusion that the cityscape was miles — rather than 50 feet — away from the action. But creating depth caused significant problems for Phillips and his gaffer, Alan Shelley. Observes Phillips, "Without smoke, it's amazing how miniature-like everything looked."

This was particularly problematic given that there's no such thing as a wide-angle lens for 65mm 15-perf cameras to exaggerate the miniatures' space and depth. In fact, the widest corrected lens is a 40mm, the rough equivalent of a 12.5mm spherical lens. "But a 40mm has much less depth of field than a 12.5mm," laments Phillips, "and the next widest lens after that was a fisheye! We shot most of the sequence using a 40mm Hasselblad lens that Marty Mueller of MSM Design tricked down to f32 to maximize the depth of field."

Many of Kong's shots required optical compositing, so Phillips shot on Kodak 5248 with exposures averaging between 10 to 20 seconds per frame to keep grain size to a minimum. "Some lasted minutes each when we needed to hold focus on Kong, often only inches from camera, while keeping our miniature background, 40 feet away, in focus," Phillips says. "That was nearly impossible. We were almost beyond what lenses can do."

There were other equipment issues as well, beginning with Ron Schmidt's very small, very clever Pioneer Showstar 65mm 15-perf camera. Notes Phillips, "It's the equivalent of an ultra-miniature camera. It measures only 8" wide and 6" tall, and the displacement magazine comes off the back rather than sticking above, below or to the side of the camera — so it worked great squeezing into those tight spaces between the buildings on a narrow boom. However, the camera presented difficulties for us. Bill Thomas at Kuper Systems had to create a custom interface between their motion-control system, the Pioneer camera and our video system.

The smoked set created innumerable dilemmas for the animators. Working in large-format and motion control, David Allen and his assistant, Chris Endicott, turned out 10 stop-motion frames an hour at best. Also, since they were shooting in smoke, Allen and company could never stop in the middle of a shot. "Any time we



Top: ***King Kong is adjusted for his stop-motion climb through the San Francisco skyline. The heavily smoked set required special precautions in order to shield sensitive computer and camera equipment from particle contamination.*** **Bottom:** ***In his full 70mm glory, Kong towers over the urban jungle.***

started a shot, we had to finish it because the smoke would settle on everything, including the camera lens and the objects on the set. There would be a noticeable bump if we went home. One shot went on for almost 26 hours! Dave and Chris just kept working and working; we let them take an hour break so they could rest, but then they went back to it."

While Kong, the San Francisco miniature and the smoke were shot in-camera, the full-scale Steerman bi-planes were filmed as live action at an airfield outside San Francisco, then optically composited with interactive lighting from the miniature motion-control searchlights (Xenotech flashlights made for nice miniature light sources).

The composites, relatively simple in 35mm terms, presented a daunting challenge in 65mm 15-perf. The task went to IMAGICA USA, with their unique ability to produce wetgate composites in all large formats. Headed by Christopher Reyna (who created the 65mm 5-perf composite of the triptych sequence in Abel Gance's 1927 *Napoleon*, and served as technical director on Universal Studios' 65mm 15-perf *Back to the Future* ridefilm), the firm began working on *Special Effects* at Simpson's request years earlier. Reyna, as the film's technical consultant, helped devise methods for achieving the film's array of optical and digital effects.

A cool overview of the history of effects ("As much as we can do in 40 minutes," according to Burtt) follows the dynamic Kong prologue, including over 120 clips ranging from paper prints of Georges Méliès' pioneering shorts to Republic Studio's archival materials (including IPs and original nitrate negatives) which were restored by two additional houses under Reyna's supervision. IMAGICA also windowboxed effects images from 40 landmark films in large-format. "We kept the original aspect ratio of all of the clips, which are presented in their original 35mm or 70mm format," Burtt says.

An entire chapter is devoted to Burtt's favorite topic: explosions. This segment showcases the remarkable pyrotechnics created by the legendary Lydecker brothers for the Republic serials [see *AC* Dec. 1991]. "I really admired their excellent explosive work in the films I loved as a kid," Burtt recalls, "so we tried to find the best roadster-off-cliff explosion and the best plane crash from *Flying Tigers* [1942]. Then we moved up to probably the largest pyrotechnic job in recent memory, *Independence Day* [see *AC* July 1996], which was done by Joe Viskocil, who blew up the Death Star. Joe and I both started on *Star Wars* together it was great to come full-circle and feature him as the reigning genius of the miniature explosion!"

Burtt, with cinematographer Jack Tankard, shot behind-the-scenes 65mm 15-perf footage of Viskocil setting up *ID4*'s pyrotechnics, and then filmed the explosion of the White House at high speed using a special camera engineered by the Imax Corporation for NOVA's 1989 film *To the Limit*. It was an extreme challenge given his equipment's limitations.

"Let me tell you about limitations!" Burtt laughs. "This section had to be done cinema verité, which would have been difficult with a 75-pound, large-format camera. The images look great, but it's completely different from making documentaries with a handheld Betacam. Blimping the camera for sync-sound restricts your mobility even more, and due to the size of the film, the magazines have loads of only three minutes. It's hard to be unobtrusive! But the new MSM 9801 camera really worked for us — it's smaller, lighter and more user-friendly than traditional large-format cameras."

(Marty and Barbara Mueller of MSM Design, who designed and developed the MSM 9801, were recognized for their outstanding achievement with a 1996 Scientific and Engineering Award by the Academy of Motion Picture Arts and Sciences.)

Covering the behind-the-scenes events of *Independence Day*, *Kazaam*, *Jumanji* and the *Star Wars Special Edition* in verité style meant that the NOVA crew spent much time hanging around their respective sets, 65mm camera in hand, hoping that they were in the right place at the right time. Fortunately,

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the MSM 9801 enabled faster lens changes, and with its rotating eyepiece, "I didn't have to stand on my head to look through the viewfinder," says Burtt. "Because it weighed only 50 pounds with its basic magazine, we could actually put it on a Steadicam. A smaller magazine brought the weight down to 38 pounds, allowing our operator, Guy Woolley, to get five or six great Steadicam shots in the film — following Joe Viskocil, for example. That gave us mobility without building elaborate dolly tracks and rehearsing our moves, which people don't like you to do on their movie sets! We had to tread carefully while the effects people worked out problems and struggled to beat their deadlines. But Marty and Barbara Mueller's new camera allowed us to work as quickly as we could imagine and keep out of the way."

Another survival technique was shooting Kodak 5298 in order to maximize depth of field and take advantage of available light. "Sometimes, we were shooting at night," says Burtt. "On other occasions, we were tucked into the corner of someone else's soundstage without any lights. We had to go all the way wide open. We shot more of the 98 than anything else, about 100,000 feet, compared to 50,000 feet in 48 and maybe 6,000 feet of 45."

The 98 stock once again came into play when Burtt's crew shot the night exterior scene of the White House being obliterated by a mammoth UFO for *Independence Day*. The high-speed Imax camera was right next to the production's camera, capturing the same angle, "so we have that totally in-camera shot in 65mm 15-perf," says Burtt with satisfaction, even though he couldn't shoot at quite the same frame-rate used by the *ID4* crew. "The production's White House cameras ran as high as 300 fps, but our high-speed limit was only about 100 fps, and we had to get a special Estar-based stock from NASA so the film wouldn't rip up in the camera. Despite our slower frame-rate, the footage looks good because of the angles we chose. We placed our camera in close to get an appropriate view of the explosive event as the audience would see it in the finished film."

The following sequence proves that George Lucas hasn't been the only one retooling *Star Wars*. Using the original models that were placed in dry-dock over a dozen years ago, NOVA asked ILM *Star Wars* alumnus Bruce Nicholson to re-create the 1977 film's iconic opening battle sequence between the sinister Imperial Star Destroyer and the fleeing Rebel Blockade Runner for the giant screen. The same was done for the *Millennium Falcon*'s audience-thrilling leap into hyperspace. To recreate these scenes, Burtt and Nicholson planned to use most of the same traditional techniques in the very untraditional large-format realm, hoping to create the most sophisticated *Star Wars* effects yet.

The original film's Oscar-winning visual effects supervisor, Richard Edlund, ASC, recently compared *Star Wars'* effects to those of *King Kong*, and the sentiment is echoed by Burtt. "Watching *Star Wars* now," Burtt says, "you can see how crude some of its effects are, because there have been so many great effects since. We wanted to re-create the audience's impression of those shots. George Lucas is restoring *Star Wars* for just that reason, but he's not redoing the opening shot. We've done it just for *Special Effects*."

Their biggest fear was that the charm of the original film would be lost. "That first shot pulled you into this whole new world," opines Nicholson. "Although some of the effects are flawed, we put a lot of heart and soul into *Star Wars* to help George achieve his vision. We didn't want that to be lost in the translation."

Lucas originally planned to build a 50' Star Destroyer model for the famous ship-flying-over-camera shot, but Edlund persuaded the director that his crew could pull it off with a 5' model. Miraculously, they did, using a 15mm rectilinear lens on a tilting lensboard, which actually scraped the paint off the bottom of the small model. In redoing the shot in 65mm 15-perf, Nicholson and ILM were really tempting fate as they stared into the same pit Edlund had almost 20 years earlier.

Suddenly, there was sense of déjà vu at ILM, with the effects artists struggling to overcome the same problems surmounted by their predecessors. Standard effects issues like depth of field and model detail became hypercritical given the crystal clarity of every frame. The task of making the camera and motion-control rigs work harmoniously was hampered by the equipment's size. Nicholson and ILM therefore rented a Pioneer lightweight 65mm 15-perf motion-control-type camera, similar to that used by Phillips to shoot the Kong sequence. Unfortunately, Nicholson and ILM special effects cinematographer Pat Sweeney didn't fare as well as Phillips.

Their Pioneer camera proved "unreliable and broke down a lot," Nicholson sighs. "After the experience of this show, I talked to Marty Mueller about building a 65mm 15-perf effects camera; I think he's doing that, so it'll be available."

One of the few constants on an otherwise unpredictable shoot was the Kodak 65mm 5248 stock that Sweeney used for all the model photography, which in itself was based closely on the original shots. "We went to great pains to follow the original lighting scheme, which we enhanced with a bit more sidelight to create more shadows," Nicholson contends. "The 48 gave us really good image quality. It was absolutely the right emulsion for this kind of photography."

Still, there were other problems. Nicholson and Sweeney quickly realized that shooting the 5' Star Destroyer model built for *Star Wars* meant retooling the cantankerous Pioneer camera, since the lens was nearly half the width of the model! Consequently, they were forced to abandon the original *Star Wars* model for its successor, a virtually identical, highly detailed 8' Star Destroyer created for *The Empire Strikes Back*.

After turning the 8' model and Pioneer camera onto their sides, Sweeney backed the motion-control rig up from just beyond the ship's nose along its entire length, creating the illusion that the Destroyer was flying into frame. Per Burtt's request, the camera traveled another six feet past the rear of the ship, so that the Star Destroyer

would end up more in-frame than in the original shot. But even using the larger model, Nicholson and Sweeney struggled to keep the entire ship in focus. "We had to get far enough away from the model so we could hold depth of field on the shot, and we also had to get as close as possible and still hold depth of field on the entire model!" Nicholson says. "Pat photographed it at five or six seconds a frame using a 50mm Hasselblad lens, which Marty Mueller stopped down to f45. That was equivalent to a 25mm VistaVision, but not quite as wide as the 15mm lens Edlund originally used, so Pat was exceedingly close on the model to carry depth of field. At one point, the lens was ½" away from the model, so we had to tilt the lensboard just the way they had on the original shot! Then we had to pull back a little further because we didn't have quite enough depth of field! We were right on the bloody edge of everything, just barely getting away with it."

To make matters worse, the Destroyer model's extra detail, which everyone agreed was necessary for large-format, actually worked against the realism of the shot. "We had to rework our approach: it's one thing to shoot in 35mm, and quite another in 65mm 15-perf, where the camera the greater image fidelity made the Star Destroyer look like a model," Nicholson admits. "The detail was just killing us until the model guys knocked it down using white powder. I didn't expect this much of a learning curve, since this was just a motion-control miniature shot. But the image resolution, depth of field and the equipment were more demanding than I expected."

Multiple beauty and light passes were shot separately on both the Star Destroyer and Blockade Runner miniatures, then digitally composited with some extra ingredients. This process included adding nebula and moving stars in the background, a more three-dimensional feeling to the planet and the lasers. The nebula hailed from a photograph taken by NASA's Hubble Space Telescope; the planet was Ralph McQuarrie's original matte painting of Tatooine, which was rephotographed and touched

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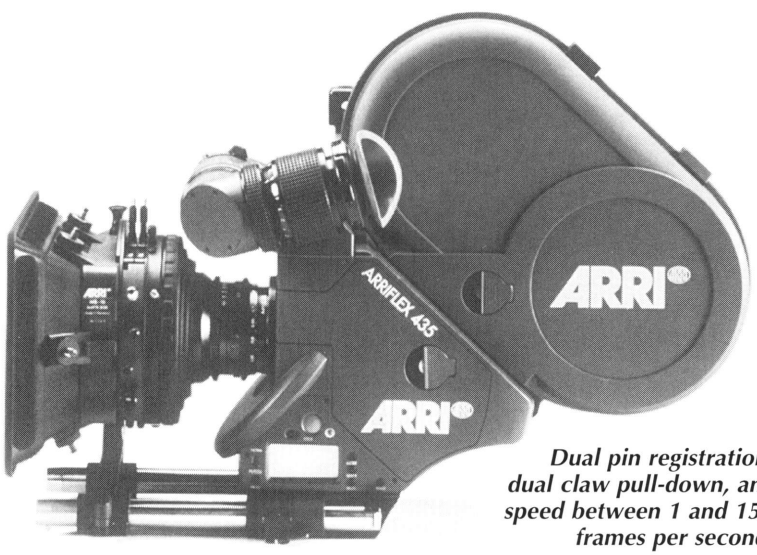

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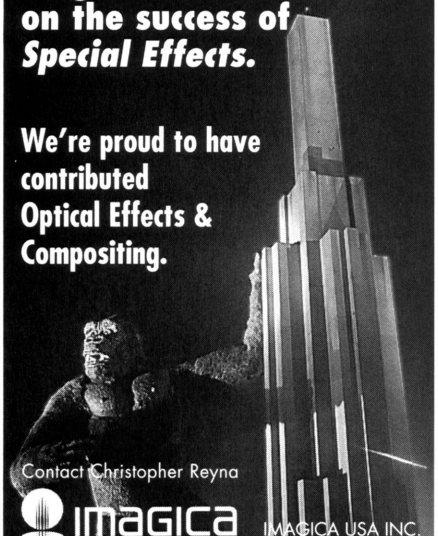

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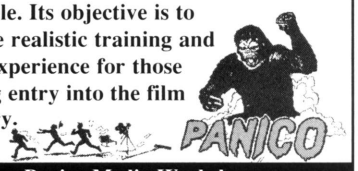

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up in Digimatte with clouds and drop shadows for added depth. The grander starfield and lasers with vanishing points were 2-D CG animation. ILM also added a shockwave from a big laser hit, and substituted real pyrotechnics from their stock library for all of the original animated flak bursts.

Compositing this shot proved to be a homecoming for Nicholson. "I did optical lineup and put all of the elements together on the original film," he says proudly. "I think John Dykstra [ASC] and Adam Becket in the animation department worked with George to get the right rhythm of the laserblasts and the flak bursts. The original shot felt frenetic, because there's this laser war going on, and yet there's also a sense of the immensity of the Star Destroyer. I wanted to make sure we retained that feeling for *Special Effects*. After studying the original shot, I actually made an exposure sheet timing the rhythm of the laserblasts — bing-bing-bing-bang-bang! — then I interpolated them into our slowed-down 65mm 15-perf shot. Although we had more laserblasts, they had the same rhythm as those in the original scene. Going to the trouble of retaining that rhythm, I really appreciated George's feeling for pace, even in an effects shot."

To bring *Special Effects* into the digital era, ILM allowed Burtt and cinematographer Reed Smoot to go on location with them as they shot background plates to augment the original *Star Wars* sequence of Imperial Stormtroopers scouring the sandy surface of Tatooine for R2D2 and C3PO. This time, however, the Stormtroopers won't just sit statically atop green dinosaur-sized lizards (called Dewbacks) — they'll be *riding* them across the desert. "The original Dewback was really just a big Halloween costume with a head that bobbed slightly," Burtt explains. "Now ILM has re-created the Dewbacks in CG so they can walk up dunes, turn their heads and tails, and vocalize. Some of the final composites will have their debut in our film."

ILM also re-created certain CG animals from *Star Wars* alumnus Joe Johnston's jungle-in-a-house epic, *Jumanji*. One of the film's computer graphics supervisors, Ellen Poon, oversaw new shots with the mammoth car-crushing elephant to demonstrate how effects are created in CG. "They broke it down in stages," Poon recalls. "First, [the NOVA crew] filmed us starting our studies of lions and elephants at the zoo, then they showed us building the elephant model and doing the wireframe animation. Later, we also rotated the model as it walked, showing it from a lot of unusual angles to help audiences understand that once a CG model is built, we can move our virtual camera around and 'film' it from every angle."

The digital compositing of the custom *Jumanji* and *Star Wars* shots necessitated the creation of the first digital scanner to accommodate the 65mm 15-perf images. This job fell to ILM's scanning and filming department head, Joshua Pines, and his team, whose task was to condense the tremendous amounts of file management and processing time. "It was my most challenging project of the last year!" Pines groans. "The whole thing started years ago when Simpson asked us to do this film. We did a feasibility study to see if a team of us could completely design and build a 65mm 15-perf scanner from scratch, which we did. We figured out the lowest resolution we could get away with and still produce something that wouldn't send people screaming out of the theater. Before this project, nothing existed which could do that well. "

Nevertheless, within two years, Pines' team built the scanner and dedicated a huge Challenge processor to the NOVA project, reducing the cost-prohibitive processing time. Meanwhile, methods were devised to manage the enormous processing of the large-format element files. Most shots required two days to composite. It's remarkable that a film covering the 100-year history of special effects should make history of its own. Beams Burtt, "We hope that the technical byproducts of what we've done will benefit other filmmakers." What a grand way to inaugurate the second hundred years of special effects. ◆

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Future Shock

Director James Cameron and director of photography Russell Carpenter, ASC are joined by a team of experts to tap the third dimension in *Terminator 2 3-D*.

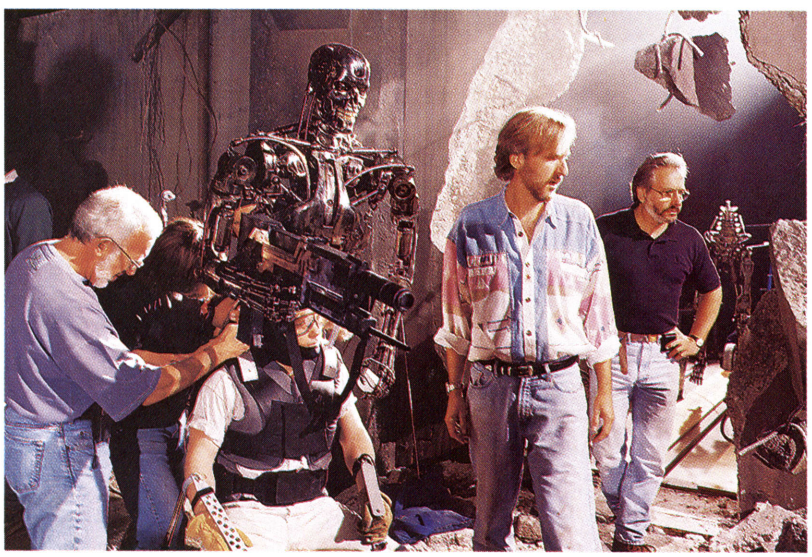
by Christopher Probst

Above: ***Carpenter and Cameron on location at the desert pit-mine. "The color scheme was to shoot HMIs, and then take it more toward the cyan in printing, which is what Adam Greenberg, ASC did in*** **Terminator 2,** ***" explains the cinematographer. "I was following that bible."*** **Right:** ***Digital Domain co-founder and animatronic director Stan Winston adjusts one of the terminator puppets (operated by Shane Mahan) during the shoot at Renmar Studios while Cameron and action-scene director John Bruno look on.***

WHEN WRITER/DIRECTOR JAMES Cameron created the $6.5 million pre-apocalyptic cautionary tale *The Terminator* in 1984, few could have predicted the film's impact. Propelling Cameron and then-struggling actor Arnold Schwarzenegger into prominence, the time-travel actioner quickly embedded itself in our pop-culture mythos. Cameron reflects, "I think it would be impossible for someone to imagine that a little, low-budget techno-shocker being made in 1983 would have the long-term ramifications that we're experiencing. When I was writing it in my little one-bedroom apartment in Tarzana, California, I could only think, 'I just hope I survive the shoot!'"

Seven years later, Cameron revisited his *Terminator* roots with the $100 million sequel, *Terminator 2: Judgment Day*, which cleaned house at the box office. It also pushed the effects envelope into uncharted territory by pioneering the use of computer-generated imagery, and earned Cameron praise for creating a logical continuation of the first film's universe.

So when MCA/Universal Studios and Landmark Entertainment sparked Cameron's interest with the concept of a 70mm 3-D *Terminator* attraction, the director had definite ideas for what essentially would be the third installment in the franchise. "*Terminator 2 3-D* is only about 12 minutes long, but it's definitely the next film — not a rehash of things you've seen," explains Cameron. "When the powers-that-be at MCA said, 'Well, we'll get a guy, we'll put him in makeup, and it'll be kind of a generic Terminator,' I said, 'There's only one Terminator. Let's be real about this. If we're going to do a 70mm attraction based on the *Terminator* films, let's really do it. Let's get Arnold, let's get Eddie [Furlong], let's get Linda [Hamilton] and let's get Robert [Patrick]. Let's not mess around. So we went into it with the idea that we were actually creating a third movie — albeit a small one — that would create a stepping stone to a third theatrical production and keep the mythology alive in the public consciousness."

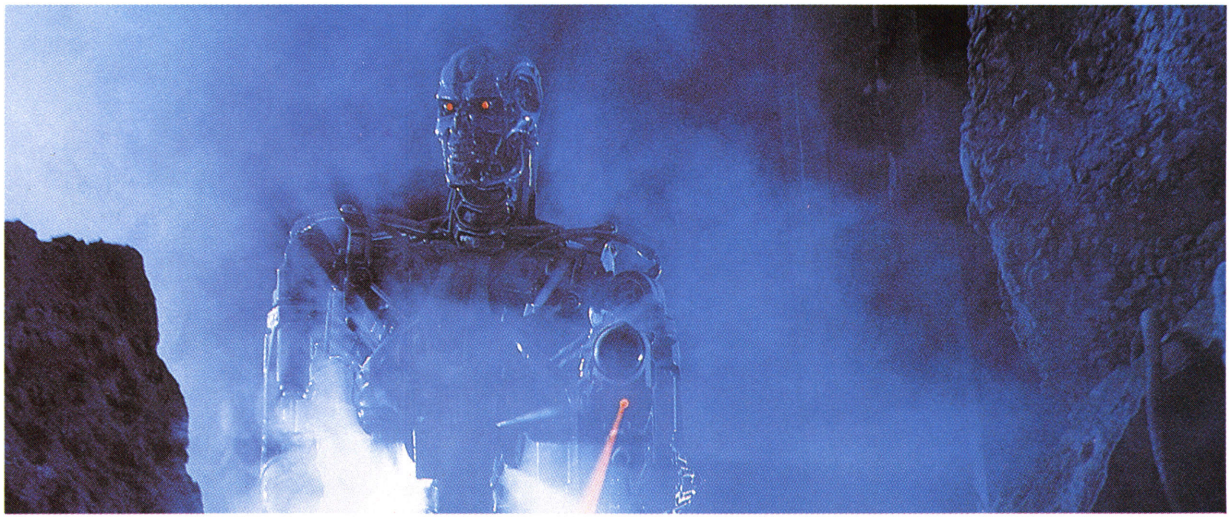


Photos by Virgil Mirano, courtesy of Digital Domain and Universal Studios Florida

This visually dazzling special-venue attraction is divided into three distinct sections. Act I begins in the present-day auditorium at Universal Studios Florida, where the fictitious Cyberdyne corporation has ostensibly assembled the audience for the premiere of its latest technological innovation: the Cyberdyne System's model T-70 automated fighting infantry unit. After the audience has donned safety (3-D) glasses for protection from the chromed, eight-foot-tall animatronic T-70's laser fire, the presentation is interrupted when live actors portraying Sarah and John Connor rappel into the theater with guns blazing, spoiling Cyberdyne's technological event.

Alarm Klaxons blare and emergency lights flash as bullets blast through the towering 25' x 50' Cyberdyne logo covering the wall behind the stage. With a horrible sucking sound, the bullet holes heal and the logo melts into the familiar liquid-metal features of the T-1000, which shoots out into the audience and appraises its enemies, Sarah and John. With a blinding flash, a time-sphere appears, out of which erupts the Terminator, roaring onto the stage on his trademark Harley-Davidson Fatboy motorcycle.

The Terminator grabs John and leaps back into the glowing time portal, pulling the audience into Act II: a seven-minute, 70mm 3-D cinematic chase through



Enveloped in Cameron's trademark steely-blue nighttime lighting, a T-800 seeks its prey. (Actual 70mm film clip.) Comments Carpenter on shooting the garage scene, "In order to make sure that things didn't go completely black [in some corners of] the set, we would hide four-bank Kino Flos behind things. On film, it looks as if the area is totally unlit, but there is the tiniest bit of detail in the shadows."

the post-apocalyptic Los Angeles ruins of 2029, where the T-1000 (Robert Patrick) is joined by massive flying Hunter-Killers (HKs) and mini-HKs in pursuit of our intrepid heroes.

Act III takes the Terminator (Schwarzenegger) and John (Furlong) into the bowels of the colossal Cyberdyne Skynet headquarters. There, they intend to destroy the company's nerve center, the heavily guarded mainframe computer network. Naturally, a few surprises await the duo.

With all of the principal actors signed on and Cameron's own effects company, Digital Domain, producing the project and supplying the visual magic, supervisor Chuck Comisky was able to enlist a crew of several Cameron veterans to help tackle the daunting $60 million extravaganza. Co-directors John Bruno, who guided much of the action material, and Stan Winston, who directed troops of endoskeleton puppeteers for shots of the menacing T-800 Terminator, each shared the helm with Cameron, who oversaw the project and directed all shots involving the key actors.

Director of photography Russell Carpenter, ASC, who previously shot *True Lies* for Cameron, was brought on board for the live-action portions of the three-part multimedia experience. Also along for the thrill ride were 3-D director of photography Peter Anderson and greenscreen/miniatures director of photography Russell Lyster, as well as special effects gurus Robert and Dennis Skotak, who handled some select miniature shots (see separate story on the production's special effects).

"*T2 3-D* is a blend of the film science that I know, taken to a new extreme," offers Cameron. "We're integrating film and the proscenium theatrical experience into the same project. We actually have characters jumping in and out of the screen, so we're breaking down the barrier between the audience and events in the picture. It wasn't until we started doing the 3-D testing at Digital Domain that I began to realize just how fantastic this project could be. There is an enhanced sense of reality that comes from the high-resolution 70mm film format we chose, mixed with the illusion of depth offered by 3-D. Combined with the live action, it's very immersive."

To pull off this massive undertaking, the technologies of film, theatrical stage presentation and special venue/simulator-ride entertainment had to be married to a degree never before attempted. "We looked at all the attractions at all the theme parks just to see how things were done," relates Cameron. "Then we specifically focused on anything with 3-D in it — of which there were a number of predecessors — and analyzed what type of shots worked, what the effective moments were. We then tried to integrate that into the design of our show so that we could optimize the format."

In addition to this research, the production also tapped the expertise of veteran 3-D consultant Dr. Ken Jones.

Of course, Cameron set out to take advantage of 3-D's near-realistic imagery and blur the line between film and reality. "These are sleight-of-hand, magician-type illusions, coupled with film with frame-accurate timing — all automated. So you'll think you saw a motorcycle leap out of the future into the theater."

The primary 3-D systems utilized for *T2 3-D* consisted of a platform base on which two cameras were mounted — one horizontally and one vertically. Both shot into a 50/50 beam-splitter mirror. In order to create the 3-D effect, each camera represents the slightly different perspective of the right and left eye which we would normally use to obtain visual cues and perceive depth. The use of the beam-splitter enables the camera's lenses to see virtually the same image, but with a predetermined interocular distance between them — analogous to the distance between the human eyes, but taking into account the 50" theatre screen's image magnification. The angle at which the lenses are aimed into the mirror establishes the spatial distance from the screen that an object appears to the eye, or the distance at which the eyes converge upon that object. These various factors determine how the brain interprets three-dimensional information.

Five separate 3-D rigs were utilized during the production of *T2 3-D*, with all three of the 65mm rigs sometimes rolling simultaneously during a single shot. Approximately 85% of the project

was photographed on a platform designed by 3-D innovator Steve Hines. This A-camera "smart" rig allowed the crew to adjust not only focus and iris settings, but the interocular and convergence settings as well — all remotely via programmable Preston FI+Z digital controllers.

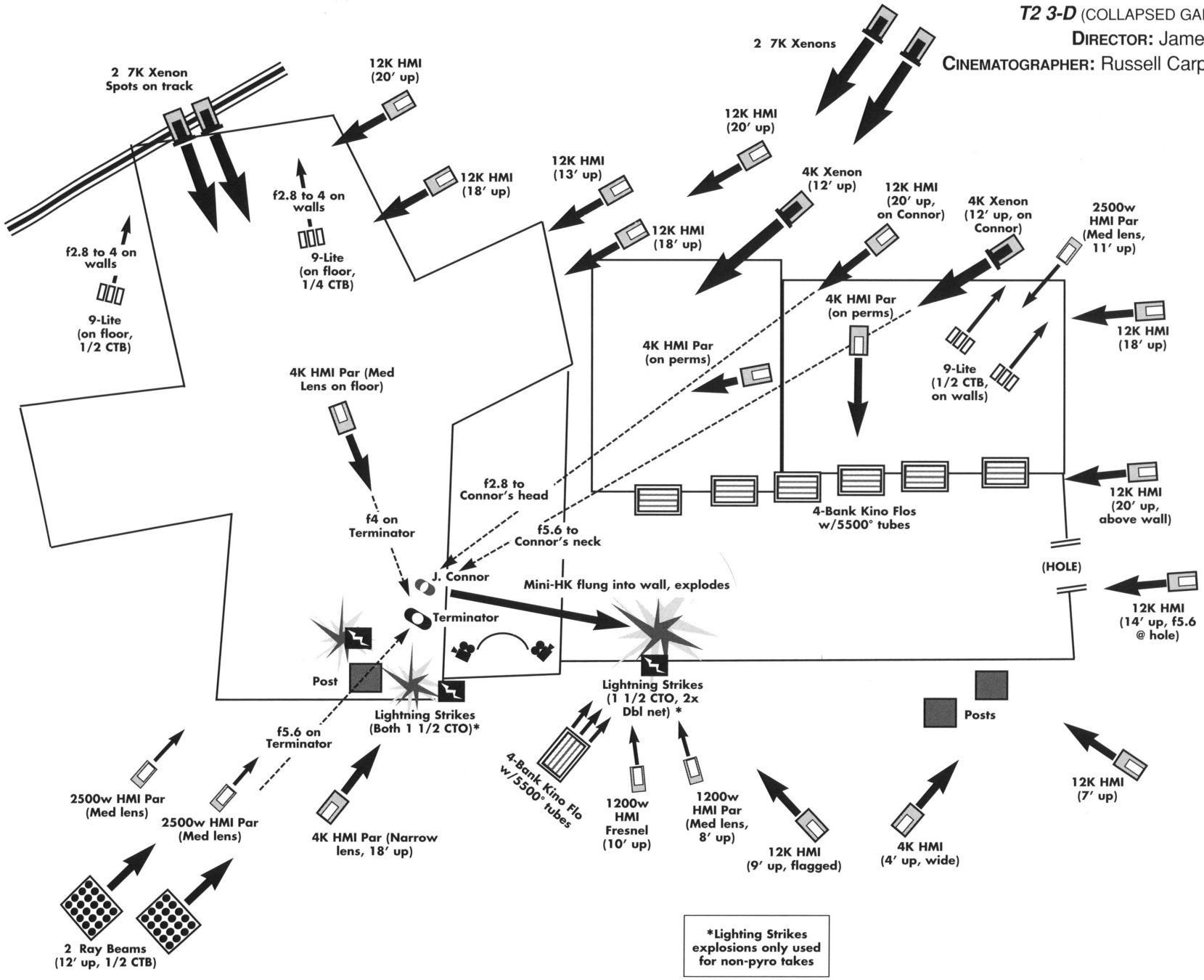
A second, "dumb" rig was provided by Paradise Visual Effects founder Max Penner, who also served as the film's co-first assistant cameraman [with Mark Jackson] and 3-D technician. This rig required manual adjustment of the interocular and convergence settings and was utilized as an additional platform for static shots. Both rigs were fitted with two of the five Showscan CP-65 cameras supplied by Paradise and used "large-format Pentax lenses," explains Penner. "We removed the cells and basically designed a whole new helix mount around them so they'd be more cinematographic lenses."

Another "smart" rig was designed and built from the ground up by cine-tech Scott Salsa in Digital Domain's camera/machine shop. This modified device had the added advantage of being computer-controlled, thus enabling the use of motion-control for many of the film's complex effects composite shots.

The Act II film portion of *T2 3-D* opens with a shot of the Terminator and John leaping through the time portal on the Harley and into the Future War. It was photographed as four separate elements by effects cinematographer Russell Lyster, who started out as a chief lighting technician before working as a director of photography on commercials and second units (*So I Married An Ax Murderer, Indian Runner*). The background plate "was a 1/24-scale miniature of a destroyed Los Angeles," he details. "When the time-sphere drifts across the screen and the motorcycle goes through it and lands on the ground, that piece of the set was 1/4-scale. So we actually had two different scales of sets matched together. The motorcycle was a real bike that we shot on stage in real-time motion control on a hydraulic rig built by Ultimate Effects. We then morphed that motorcycle into another greenscreen element of Eddie and Arnold riding. We shot that and all of the

Top: ***The Cablecam created the viewpoint of a pursuing HK aircraft. Due to the bulk of the twin 65mm rig, only the driver could ride along — requiring him to also "aim" the cameras. While solving some problems, the Cablecam created others. Says co-first camera assistant Max Penner, "By nature, it produces a large static field. So we have this static charge around the camera while we're trying to follow iris, focus, convergence and interocular all by remote as we traverse across this ground following the motorcycle!"***
Bottom: ***Pyrotechnician Roy Arbogast's spectacular work. Says veteran 3-D cameraman Peter Anderson, "We had three different 3-D systems filming that shot. When Roy did the fireball, he was literally blowing real walls up and real buildings were falling over. It was a one-shot deal." (See lighting diagram, opposite.)***

T2 3-D (EXPLOSION/HK CHASE 5-15-95)
DIRECTOR: James Cameron
CINEMATOGRAPHER: Russell Carpenter, ASC
1200w HMI Par
(4' high)
4K HMI (6' high)
Musco
(Low, 20-30')
FUEL
SUPPLIES
BUILDING
X
(Fire 5 floors up)
BUILDING
Musco
Musco
4K HMI
(7' high)
System 1
Paradise Rig
Telephone
Pole
SMALL
BUILDING
7K Xenon
Spot
f4
f2.8
X
Abutment
12K HMI
(8' high)
Night Sun
4K HMI (in
hole, 2' above
ground)
f4
f2.8
X
f5.6 to camera
12K HMI
(8' high)
GROUND
SLOPES
UP
4K HMI
(7' high)
OPEN PIT
System 2 DD Rig
BUS
4K HMI
(7' high)
6 or 7 squib
hits on road
12K HMI
(8' high)
4 9-Lites
(Full CTO,
flicker)
Hines Rig
Dolly - System 3
Harley Path
2 2500w HMI Pars
4K HMI (Med. Lens)
Night Sun
Musco


T2 3-D (COLLAPSED GARAGE 6-2-95)
DIRECTOR: James Cameron
CINEMATOGRAPHER: Russell Carpenter, ASC
2 7K Xenons
2 7K Xenon Spots on track
12K HMI (20′ up)
12K HMI (18′ up)
12K HMI (13′ up)
12K HMI (20′ up)
4K Xenon (12′ up)
12K HMI (20′ up, on Connor)
4K Xenon (12′ up, on Connor)
2500w HMI Par (Med lens, 11′ up)
12K HMI (18′ up)
f2.8 to 4 on walls
9-Lite (on floor, 1/4 CTB)
f2.8 to 4 on walls
9-Lite (on floor, 1/2 CTB)
4K HMI Par (on perms)
4K HMI Par (on perms)
9-Lite (1/2 CTB, on walls)
4K HMI Par (Med Lens on floor)
f2.8 to Connor's head
f4 on Terminator
f5.6 to Connor's neck
4-Bank Kino Flos w/5500° tubes
12K HMI (20′ up, above wall)
(HOLE)
J. Connor
Mini-HK flung into wall, explodes
Terminator
12K HMI (14′ up, f5.6 @ hole)
Post
Lightning Strikes (1 1/2 CTO, 2x Dbl net) *
Lightning Strikes (Both 1 1/2 CTO)*
Posts
f5.6 on Terminator
2500w HMI Par (Med lens)
2500w HMI Par (Med lens)
4K HMI Par (Narrow lens, 18′ up)
4-Bank Kino Flo w/5500° tubes
1200w HMI Fresnel (10′ up)
1200w HMI Par (Med lens, 8′ up)
12K HMI (9′ up, flagged)
4K HMI (4′ up, wide)
12K HMI (7′ up)
2 Ray Beams (12′ up, 1/2 CTB)
*Lighting Strikes explosions only used for non-pyro takes

miniatures and models in 35mm on 5248 stock because we wanted it to be as grainless as possible to match the look that had been set in 65mm. We used twin Fries Mitchell cameras on a lighter-weight 3-D rig, which was in essence the same as the 65mm 3-D rigs, so I had to take into account all of the same parameters that we had on the 65mm footage."

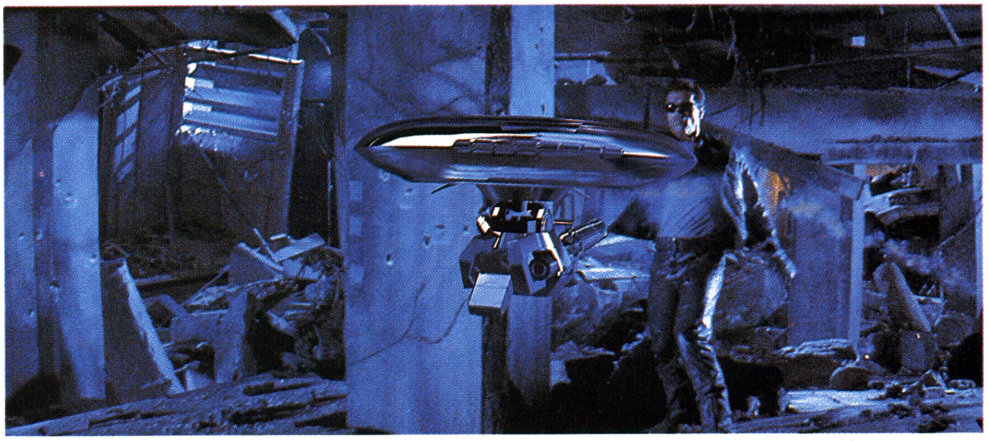
Once in the desolate future, Cameron was able to establish his trademark cinematic style of taut action, fast editing and fluid, gymnastic camera movement. But with cameras weighing nearly 450 pounds each, it wasn't easy. "You can't move a 450-pound camera very rapidly," Cameron says. "That was the biggest barrier to hurdle — we had to figure out how to move these massive cameras to create that sense of speed, exhilaration and dynamic movement people expect in a *Terminator* film."

"Movement was our single biggest challenge," agrees director of photography Russell Carpenter, who had to solve the logistical and physical nightmare of wielding a camera the size and weight of a refrigerator. "I quickly discovered that 3-D is a much more exact science than conventional 35mm photography. The two images have to be in exact relationship to each other. If you bump the camera, or if you go around a curve — which introduces g-forces and torque on the magazines and starts to flex the two images — you have to be aware that you might be inducing eye-strain in the viewer. Also, the slightest shudder can ruin the 3-D effect, so a lot of testing was done in order to design rigs that didn't introduce those problems in environments that no 3-D cameras had previously been subjected to."

"We are creating the ultimate illusion," boasts 3-D director of photography Peter Anderson, whose past 3-D credits include Disney's *Magic Journeys* and *Captain Eo*, as well as *Muppet Vision* and 15 other productions. "Viewers' eyes and brain-processing are very sensitive. So we have to make 3-D work [within those parameters]. When we look at something close, our mind actually knows that it's focusing close. People who only have one eye can judge depth in three ways — size, perspective and the distance an object is from them. They can actually learn to sense where their focus is. [In a film], the audience is focused on the screen, so we have to cheat that.

"We'll often talk about pulling focus differently for 3-D than we would for 2-D, just to make it work. Sometimes we'll delay it, sometimes we'll accelerate it. Basically, we'll look at a situation and say, 'This is the way I would look from here to here.' Then we'll make the focus work that way instead of just tracking with the particular object, modifying it for how we want the shot to begin and end and incorporating the interocular and convergence so that it looks the way a human being would see it. In *T2 3-D* we just happen to be doing that four or five times faster than we would in most 3-D theme park films."

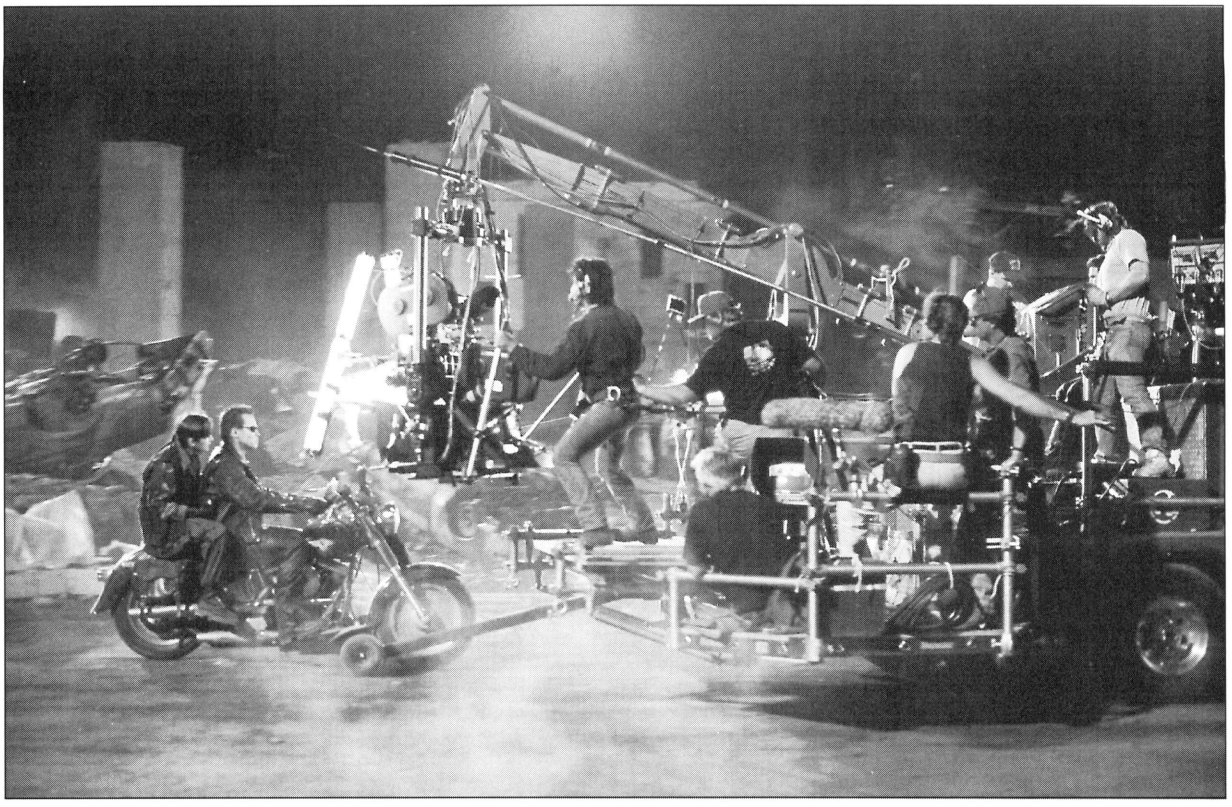
Adds Carpenter, "We had to realize that what might work really well in a conventional motion picture might cause visual whiplash in 3-D. Luckily, Peter Anderson was on this show, and his experience helped to guide us and let us bend the rules a little bit. For instance, when we were doing a shot, he would constantly be adjusting the apparent depth and the apparent placement of objects within that depth — because in 3-D you can arbitrarily say, 'I want the object to appear as if it's right in my face; now, I want to take that object and move it 50 feet behind the plane of the screen. But if you have [an object placed in the 3-D foreground] and you make a cut, that thing just disappears as if it's vaporizing in front of your eyes! If you then cut to something that's way off in the distance, it's as if somebody's just snapped a rubberband on your eyeball — it's quite jarring. So a lot of thought had to be given as to where potential cuts would be. It's a shock for somebody who's coming from the world of conventional 35mm cinematography to enter this world of 65mm 3-D photography. A number of the methods that you'd normally use, in terms of lighting to create depth in 35mm photography, are no longer necessary. The depth creates itself."



A Mini-HK confronts the Terminator in the collapsed garage. The device was primarily seen as a CG element, while a practical model stood in during its eventual destruction. This shot was photographed with a 35mm Arriflex camera equipped with a Stereovision lens on a Steadicam operated by Bob Ulland. The footage was later scanned and enhanced digitally before being outputted to 65mm film. (Actual 70mm film clip. See lighting diagram, opposite.)

The film's dynamic opening chase through the debris-ridden War Zone had to match the acrobatic, kinetic ferocity that had thrilled audiences in the first two *Terminator* installments (both shot by Adam Greenberg, ASC), and offer newer, more exciting feats. Originally, the production had intended to utilize the inoperative Kaiser Steel Mill location in Fontana that had been used to great success in *Terminator 2*. However, by the time the production was gearing up to shoot, the original site "had been dismantled piece by piece, taken to China and put back together again," notes Carpenter. "But the raw ore that the mill had used was also mined by Kaiser, so we went to their big open-pit mine out at Eagle Mountain near Blyth."

The long-abandoned mine location was conveniently slated for demolition, and the production obtained permission to destroy any of the few structures that remained standing. "The desert location went on for acres and acres. Unlike the situation on most sets, you could see very far into the distance," Carpenter recalls.



The Terminator and Connor take flight on their Harley. Explains Carpenter of this elaborate rig, "We surrounded the port of the camera with Kino Flos so when Arnold and Eddie were on the motorcycle, moving back and forth rapidly as they were being towed on the Shotmaker, we would have a pretty decent ambient fill that wouldn't give itself away as being very sourcey." Camera operator Paul C. Babin worked via monitor, using Paradise's custom-built Cartoni fluid-head system suspended from a Lenny arm.

Explaining his initial take on the picture's style, the cinematographer elaborates, "Wanting to continue along the lines of what had been established in *T2*'s apocalyptic war scenes, I knew that I'd be using a lot of hard cross-light. I used a tremendous level of footcandles to cover the immense area, which was basically the size of a small town. In order to keep the grain down, I exposed Eastman Kodak's EXR 5298 fairly conservatively due to the added clarity in 70mm 3-D. I had four Musco lights generating approximately 300-plus footcandles because I wanted to work at a T5.6 to compensate for the limited depth of field inherent to shooting 65mm. Also, we lost one stop due to the use of the beam-splitter, and then another 25 percent because we were shooting at 30 fps. So [after compensating] I was working with an ASA of 100 for these vast night exteriors, trying to shape the light and keep the units out of the shots. Jim's comment when he first saw the area lit up was, 'People in the neighboring town are probably going to get up and go to work — they'll think it's morning!'"

Gaffer John Buckley elaborates on lighting the expansive desert locale: "The Musco lights were used as base lighting and for hard kickers. We also had a Night Sun and a Nightlight to bring four city blocks up to a T5.6. The Night Sun is a platform on which you can mount whatever fixture you want; we had five 12Ks on it. The Nightlight is also a high platform, but with three 12Ks on it. We used both as our fill."

As the Terminator and John are pursued through the wasteland, Carpenter created several layers of ambient moon lighting, interactive fire/explosion effects (provided by pyrotechnician Roy Arbogast), a Xenon searchlight and supplemental laser effects. He points out, "The plus of working at [a T5.6] is that when the numerous explosions went off in the background, our ambient stop was up so high that it made for really rich, deep-red blasts."

Carpenter had previously put this lighting technique to good use on *True Lies* to balance out flames and ensure good image saturation during pyro scenes [see *AC* Sept. 1994].

He continues, "Besides having all that help from the heavy [Musco and Night Sun] artillery, we also had to run a substantial amount of cable so that we could hide our smaller HMI units behind piled-up cars and debris. The only tungsten units we used were 9-lights with orange gel on flicker units to simulate and extend the effect of the fires."

Expands Buckley, "[For the fire effects] we used the 5K Magic Gadget, which is made by a company out of Portland. It's the only 5K flicker generator I know of, and there are very few of them in Hollywood. You can set a high mode and a low mode, meaning you can set a high frequency so that the highest it'll hit is one spot and the lowest is another spot. It will then automatically change the electronic frequency and dimming pattern within that range. We also used Lightning Strikes units with lavender gels to augment the animated laser and explosion effects that would be added later."

To traverse the location's bumpy terrain, every camera-moving platform known to man was utilized to lessen the toll on the sensitive 3-D rigs. "Of course we had a Shotmaker camera car," says Carpenter, "as well as a Titan crane, which basically became our dolly when we got into the studio. But the most exotic piece of equipment

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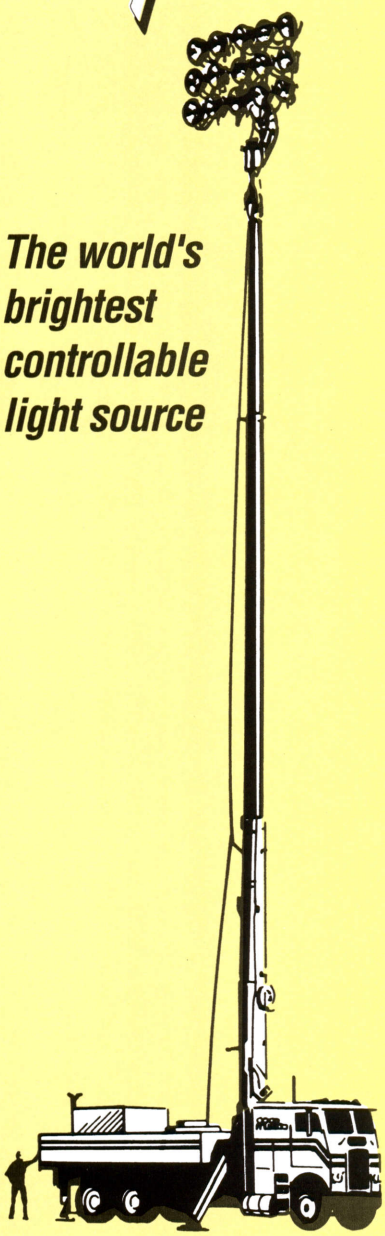
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we had out in the desert was the Cablecam. It's a cable-mounted system usually set up so two people can ride on this sort of gondola, like an Alpine ski-lift. [To ensure complete safety], we only had one person on it. The driver basically aimed the camera. [Utilizing the Cablecam], we were able to follow Arnold and Eddie on the motorcycle at quite high speeds, fly through explosions and sail over obstacles that a conventional camera car couldn't get through."

Ditching the pursuing T-1000, the Terminator and John flee into a crumbled parking structure to avoid the airborne Hunter-Killers. This second half of Act II was shot on stage at Hollywood's Renmar Studios. Production designer John Muto (*Species*) had the sets built to match the established look of the semi-obliterated desert mine location.

Camera movement was achieved with a "double-jointed" system — a Titan crane fitted with a platform on which a Lenny arm was mounted. A custom-designed Cartoni fluid head (supplied by Penner and Paradise co-founder/key camera-grip Tim Thomas) held the massive 3-D rig from above and was free to turn on all axes.

"To get the most light possible onstage, we used Dinos as our main lights," Buckley reveals. "However, they're literally impossible to cut. So we just learned to turn off a certain bank here or there and try our best. It was difficult because the concrete [walls and pillars] were so white. We wanted to bring those elements up while leaving everything else in the background at least a stop down."

"The sheer intensity of the light level was somewhat unusual," says Carpenter. "I find that when I work at high, bright levels, I tend to think that there's more fill light than there actually is. So I used Polaroids as a reference."

Additionally, Carpenter once again used interactive firelight and Lightning Strikes units, this time to suggest the firing of the mini-HKs which pursue the main characters into the structure. Says Carpenter, "The Lightning Strikes units were timed with the action. We knew when the hits would happen, and all of those scenes were very carefully choreographed and plotted out to determine exactly where each of the elements would be."

"Xenons simulated the searchlights from the big [HK] flying overhead," adds Buckley. "Key grip Lloyd Moriarity had put up an excellent carriage with a chair and 7K Xenon that ran on a track mounted to the ceiling. [Operating the light] was a difficult job because it got pretty hot and we were in such a confined space. The light would hit the top of the set if it wasn't in the right position, giving Lloyd a jolt as he traveled along the track."

For moving POV shots from the mini-HKs, Cameron wanted to be able to put a 3-D rig on a Steadicam. Fondly recalling the reaction to this seemingly impossible request, Carpenter says, "Of course, everybody went pale white! We then started looking for any experimental 3-D system that had been devised in the last 40 years, because the heyday of 3-D was in the 1950s and early '60s. Literally just a few weeks before we started photography, somebody was able to find something that produced an adequate picture. Then Jim said, 'That's enough, because I know these shots are going to be moving. And I know what the computer can do.' So we actually mounted a 35mm Arriflex camera with a Stereovision lens system — which divides the image through prisms and places one image over the other, enabling them to be extracted for later digital compositing — on a Steadicam, and Bob Ulland ran it through our set!"

Summing up the *Terminator 2 3-D* experience, Cameron concludes, "The beauty of 70mm 3-D is that it's almost indistinguishable from reality. I know people are going to feel excited when they find themselves in the middle of a three-dimensional *Terminator* experience. But beyond that, we've created new machines, new adventures, new adversaries, new problems for the Terminator to face, and those are also in 3-D. So the thing is really a sensory assault. It just keeps coming at you." ◆

Digitizing the Third Dimension

Digital Domain assaults audiences with an array of 3-D effects methods.

by Ron Magid

VISIONARY FILMMAKER JAMES Cameron had a problem: how do you top *Terminator 2*? The answer for those lucky enough to be heading to Universal Studios Florida is Cameron's latest extravaganza, *Terminator 2 3-D*. Produced by Digital Domain, the effects powerhouse co-founded by the director, this hyper-theatrical attraction has utilized new effects technology to make the impossible possible.

In planning out the attraction's three-dimensional effects, Cameron first asked John Bruno (his visual effects supervisor on *The Abyss* and *True Lies*) to conceptualize the project on paper. Both agreed that the graphic 3-D moments had to feel organic, not grafted on. "We had to stick to a normal cinematic style," Cameron explains. "If something happened to come off the screen, we had to integrate it so the audience wouldn't feel as if they were just getting poked in the eye one time after the other — even though the goal was to poke them in the eye one time after the other!"

When Industrial Light & Magic created the 3-D effects for Disney's groundbreaking *Captain Eo* 3-D attraction, they composited elements of their actual miniatures — real objects shot in 3-D — into the film's stereoscopic environment. But *T2 3-D* demanded that Digital Domain pioneer methods of marrying computer-generated effects into their 3-D environments. Although CG objects may appear three-dimensional, they only exist on the two-dimensional screen of the computer monitor. "That was a pretty wild concept," admits longtime Cameron collaborator Chuck Comisky, *T2 3-D*'s producer and visual effects supervisor.

Ultimately, CG animation would comprise at least half of *T2 3-D*. "We applied the same principles to shooting our 3-D CG objects as we would if we were shooting them for real," says Comisky. "Darren Gilford, Digital Domain's feature and themepark art director, styled the CG objects, which were then built in 3-D using Prisms and Alias/Wavefront 3-D animation programs. Even though these are flat 2-D objects, they're constructed in 3-D, which gives the objects virtual depth. Next, the CG artists animated each object for the right eye, and 'shot' it using a virtual camera in the world of the computer. They then off-set the object and 'photographed' the same animation for the left eye. Changing the angles of the virtual camera lenses, photographing what your left and right eye would expect to see, creates the stereoscopic illusion. It's amazing."

But being able to translate their "flat" CG effects into realistic 3-D objects wasn't enough. "Side Effects added stereo viewing capabilities to interlace images from both the right and left cameras," says Judith Crow, who, along with Neville Spiteri and Karen Goulekas, supervised Digital Domain's 3-D digital effects. "Meanwhile, Bill Spitzak extended our flipbook capabilities so we could preview whole sequences on our computer monitors in 3-D within the Prisms software, wearing StereoGraphics' CrystalEyes 3-D glasses."

Mark Forker, Digital Domain's 2-D compositing supervisor, finished the job on numerous SGI Onyx and Challenge workstations, compositing *T2 3-D*'s unique images via Flame software and DD's proprietary in-house Nuke software. Bill Spitzak extended the in-house compositer so the artists could view images in stereo and composite their 3-D elements at the proper depth in a given scene.

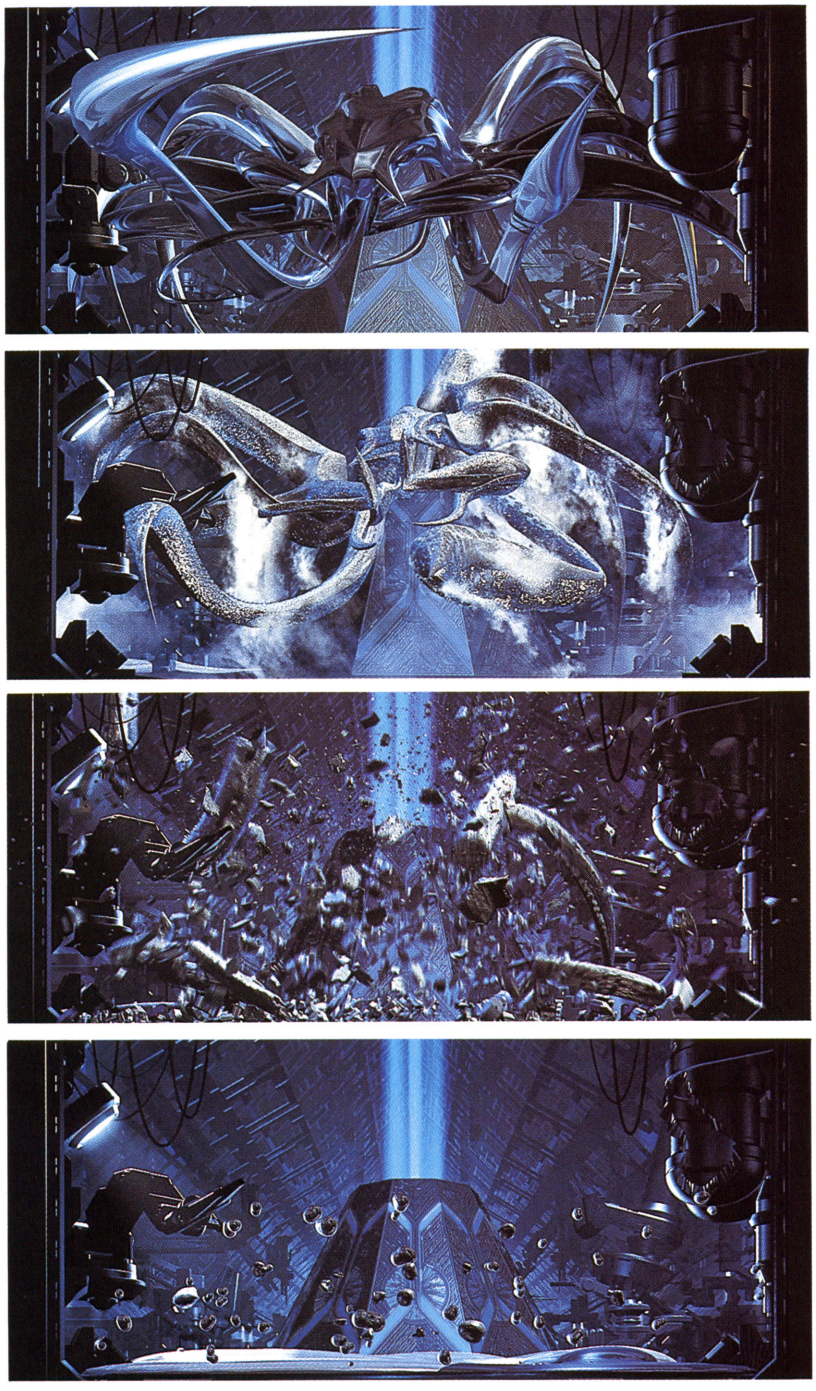
Visual consultant Dr. Ken Jones performed all of the mathematical calculations to scale down the interocular and convergence settings for the miniature and CG effects in the project.

The attraction's story (see separate article beginning on page 38) follows the Terminator and John Connor as they ride their Harley into a time portal and enter the Future War, where they're chased by the T-1000, aerial Hunter Killers (HKs), Mini-HKs and T-800 Endoskeletons. They finally face off with the T-1 Million — the ultimate liquid-metal killing machine. "Suddenly, we're inhabiting their universe," Cameron explains, "and we actually experience the Future War."

From this initial concept, the director and his production team, including co-directors John Bruno and Digital Domain co-founder/creature creator Stan

The Terminator and Connor cross the wasteland to infiltrate Skynet's headquarters. The pyramidal structure was a 1/24-scale model. Live foreground action of Schwarzenegger and Furlong was later added. (Actual 70mm film clip.)

Film clips courtesy of Digital Domain and Universal Studios Florida



From top: ***The spider-like T-1 Million protects Skynet's vulnerable CPU. Frozen by liquid nitrogen, it's then shattered — only to reform from the warming pieces. The most difficult aspect of its creation was in choreographing the metallic beast's moves to coincide with the live performers on stage. The CG Skynet interior demanded tremendous depth, which was achieved through numerous spatial cues and complex lighting animation. (Actual 70mm film clips.)***

Winston, set to work, overcoming challenges never encountered on previous *Terminator* features.

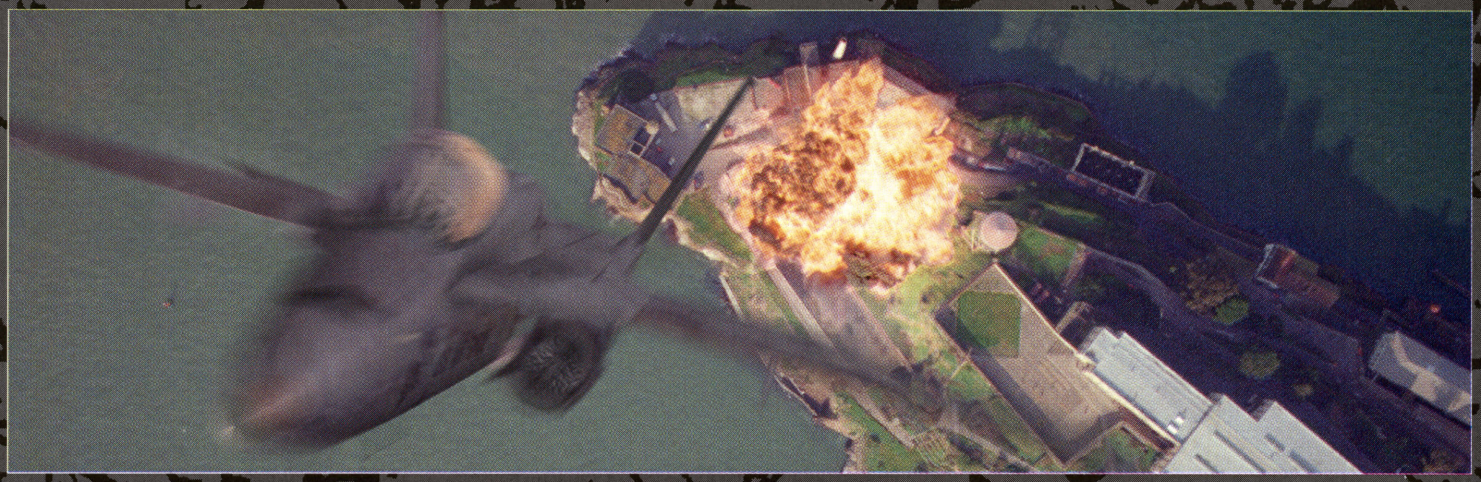
The most successful effects films utilize a of blend techniques, and *T2 3-D* is no exception. "We shot the motorcycle that goes into the Future War with Arnold [Schwarzenegger] and Eddie [Furlong] riding it on stage, using doubles for part of that shot," Comisky says, "so those were real people who were digitally composited into the background plate. The background itself combined two scales of miniature elements, married with motion-control camera moves, to create the scope of that blasted future landscape. We first shot the move on the actors on the motorcycle, then scaled it down to ¼-scale for the foreground and midground piece, then scaled *that* move down to 1/24-scale for our miniature background. Compounding that was the 3-D, involving right and left cameras and separate right and left passes!"

Cameron sees the ability to meld actors, miniatures and CG elements in 3-D as the ultimate test for the compositing techniques that Digital Domain has developed: "We're able to put Arnold and Eddie on a motorcycle racing through the middle of a futuristic battlefield 100 percent realistically in 3-D. The foreground and the background are in perfect stereo, but the two weren't in the same place at the same time. I don't think anything on that scale has ever been attempted."

Beginning the third act of *T2 3-D*, the Terminator and Connor cross the barren War Zone and descend upon the towering Skynet headquarters, an enormous pyramid-shaped installation that serves as the terminators' central lair. Miniature effects cameraman Russell Lyster photographed a 1/24-scale miniature of the ominous structure, which had a mirrorlike, highly reflective surface and necessitated hard cross-lighting to render its fine detail. "I decided to shoot on 5248 stock for the miniatures because I wanted my 35mm footage to be as grainless as possible to match the look that had been set in 65mm," Lyster reveals. "I lit all of the miniatures primarily with 12K HMIs to keep with the Jim Cameron trademark blue-look and was shooting usually at a T16/22 with ¼-second exposures to get a good depth of field for the background. We did several motion-control passes for reactive lighting of explosions or laser-fire as well as a moonlit beauty pass."

As our heroes later infiltrate Skynet, massive doors slam behind them. The theater is plunged into blackness. We find that we are within an immense elevator. It descends, carrying the Terminator, John Connor and the audience into the burnished-steel depths of Skynet.

Explains Lyster, "That whole elevator section is a miniature. We laid the miniature on its side, put the camera on its side and shot it horizontally instead of vertically. To get the effect of the laser [which appears within], I had an actual laser set at one end of the stage and everything behind it was blacked out with a black velvet tent. We lined up the laser to be in



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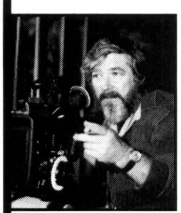

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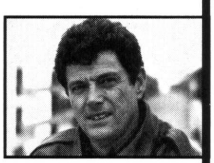

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the center of the elevator shaft and shot that as one pass. Then we shot a beauty pass of the elevator with just light on it without the laser, and then we also shot a UV matte pass. The far background was a digital matte painting."

Upon reaching ground zero, the audience is surrounded by 180 degrees of images as three sets of twin interlock 70mm projectors cast a 3-D computer-generated environment across three 50' screens which had lowered stealthily in the darkness. As our heroes attempt to destroy the Central Processing Unit controlling the fighting machines, live actors doubling Schwarzenegger and Furlong climb columns on the stage. Consistent with the Skynet "set," the screens also serve to mask the breaks between screens. Meanwhile, close-ups of the "real" Terminator and John play on a Jumbotron in the left wall, as their doubles in the theater interact with onscreen events.

> **"We not only had to devise a film environment that could hold up across three screens, we also had to create a 3-D CG creature that could move from screen to screen!"**
>
> **— executive producer Andrew Millstein**

Says Lyster of the video images, "That was all live-action footage that I shot with Jim Cameron. We actually shot with a Betacam. I thought it would be better if we shot on film, both as a safeguard and to preserve the clarity of the image, but there wasn't too much concern because they were using [the video footage] as an element within movie itself; it was supposed to be a video screen."

As envisioned by Gilford, Skynet is a futuristic, multi-storied environment containing both an assembly line for manufacturing terminator-style war machines and the brain-center that controls them. The huge central chamber is, in reality, a static 3-D CG image spreading across the left, right and center screens for the entire climax of the show. With no perspective changes, camera moves or cuts to distract audiences, Digital Domain's task became that much more difficult. "After we built Skynet's interior, we had to light and texture it with all of the nuances we could imagine to make it believable," says Andrew Millstein, *T2 3-D*'s executive producer and DD's vice president of feature and themepark operations. "We had to create a sense that this place really could conceive and manage a war. We made the room less silvery than the chrome T-1000; it had more of a matte blue-gray hue. We also had a yellow spinner light on the left-hand screen, so active yellow light on screen right, the implication being that it was thrown off by the spinner. Little visual cues like that help convince audiences that it's a real environment."

Skynet looks photo-realistic, but the best breakthrough was its tremendous sense of depth. Even when viewers zero in on points beyond the subject, the image remains sharp. "We used a lot of depth cues," Millstein reveals. "We pushed the boundaries of our technology so audiences could look deep into that infinite, cavernous space, and it would stay in focus."

Additional animation added life to the static Skynet background. "The lights were animated on the CPU on the center screen, as were the robotic arms on both the right and left screens," Millstein explains. "That was all background animation. The primary animation was the creature itself."

The beast in question is the T-1 Million (or T-Meg), a menacing 50' tall liquid-metal spider — the guardian of the Central Processing Unit, Skynet's computer brain. "We not only had to devise a film environment that could hold up across three screens," Millstein says, "we also had to create a 3-D CG creature that could move from screen to screen!"

Once Gilford designed the T-1 Million, Digital Domain's sculptors created a "real world" maquette, which lead animator/

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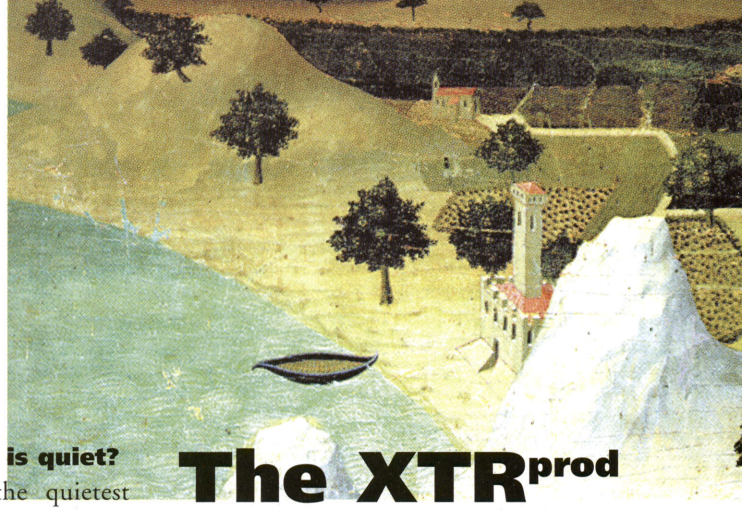

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animation supervisor Daniel Robichaud and his team studied to ensure that the creature's movements stayed in character.

"Our animators had to define believable actions for a creature of that scale, determining how quickly it could move while maintaining an appropriate sense of weight and scale," Millstein recalls. "It was a challenge locking the T-Meg into the Skynet environment, giving it the right kind of reflectivity so that it mirrored the appropriate patterns in the 'set.' We gave it tentacles that could reach out into the audience, which utilized the 3-D aspect."

Borrowing a tactic from *T2*, the Terminator and John use liquid nitrogen to freeze the T-Meg in its multi-limbed tracks and then shatter it with a single blast. "As it's blown into a million pieces, we created a super 3-D explosion sequence with crystal mercury blobbies floating in front of the viewers' faces," Millstein says. "Those blobbies then warm up, congeal into a pool we animated on the ground plane, and quickly reform into the T-1 Million."

The biggest challenge this scene presented was generating a routine for the T-Meg that would travel across all three screens and sync up with the performances of the live actors. To do that, Digital Domain first built a model of the theater in the computer. In this three-screen circus, the animators timed the T-Meg's transitions from screen to screen before rendering any high-resolution images. "We shot video of the live performance as reference, then adjusted each component to the other," Millstein says. "So we adjusted the live action to accommodate the CG, and vice-versa, and came up with something that maximized both."

Terminator 2 3-D concludes in the Cyberdyne presentation room of the present as John Connor returns and reunites with his mother, Sarah. Audiences have glimpsed the future — not just one in which machines dominate, but one of computer-generated 3-D entertainment. ◆

—additional reporting by Christopher Probst

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Scared Silly

Director Peter Jackson and tandem cinematographers Alun Bollinger and John Blick deliver both ghostly fun and terror with *The Frighteners.*

by David E. Williams

In his nascent years as a filmmaker, New Zealand's Peter Jackson was so fascinated with horror movies that he began creating his own makeups and special effects. His initial short films, shot on Super 8, were basically designed as vehicles for his latest ghastly creations. Jackson first gained wide recognition in the United States with *Dead Alive* (a.k.a. *Braindead*), a gory, Monty Python-style zombie comedy that led audiences to respond both with disgust and laughter. This twisted sense of humor had also fueled his two previous features, the 16mm alien invasion spoof *Bad Taste* and *Meet the Feebles*, a vicious satire of the Muppet movies. With these three pictures (each financed by the New Zealand Film Commission), the filmmaker attained solid cult status and developed a style that incorporated every visual tool he could muster on limited budgets. Trademarks of his emerging cinematic approach included maniacally mobile cameras, near-fisheye lenses theatrical lighting, and plenty of in-camera effects.

Jackson and frequent co-writer Francis Walsh made a quantum leap forward by earning an Academy Award nomination with their screenplay for *Heavenly Creatures*, a fantasy-tinged tale of a hideous real-life murder committed by two young girls. Under Jackson's inventive direction, the critically acclaimed picture convinced Universal Pictures to invest in the 33-year-old filmmaker's talents. The first dividends of that relationship are *The Frighteners*, a horror-comedy executive-produced by Robert Zemeckis, and an upcoming remake of the classic monster movie *King Kong*.

The Frighteners begins with an evil ghostly force arising in a small town. Appearing as the Grim Reaper, it starts methodically murdering the locals. Enter Frank Bannister (Michael J. Fox), a semi-bogus "spiritual investigator" who drums up customers among the bereaved at the local cemetery. Bannister's channels to the afterlife are legit, but his ectoplasmic pals also haunt the unsuspecting on his command. For a modest fee, he performs impromptu exorcisms for the town's duped denizens.

The only "living" witness to the Reaper's crimes, Bannister doggedly chases the demon from victim to victim. As the body-count escalates into double-digit territory, he becomes a suspect in the murders. Aided by his spooky friends, his only chance to stop the specter, and clear his name, is to determine who this paranormal killer really is (or, to be more accurate, *was*).

"Our desire was to make a picture that featured ghosts as major characters as opposed to just being effects," explains Jackson of his general approach to the film. "They have dialogue and do things that affect the story, but just happen to be dead.

"Michael J. Fox interacts with ghosts for quite a few scenes in the film, so we had to film him by himself in many shots, delivering his lines on the set to empty air, just as the actors used to in Ray Harryhausen's films. Then, weeks or even months later, we would shoot the actors playing the ghosts against bluescreen and use the computers to combine them. So a good portion of the film had to be shot at least twice."

With a schedule of about 130 days, *The Frighteners* was photographed entirely in and around Wellington, New Zealand. "I live

Top: *The psychopathic Patricia (Dee Wallace Stone) gets the drop on Lucy (Trini Alverado). John Blick (lower photo, at far right with incapacitated director Peter Jackson and fellow cinematographer Alun Bollinger) notes that lighting for Alverado's pale complexion and jet black hair was a dilemma of contrasts. He often kept the actress a stop under to compensate for her coloring.*

Photos by Pierre Vinet, courtesy of Universal City Studios Inc.

Hustling ghostbuster Frank Bannister (Michael J. Fox) is flanked by his ectoplasmic partners, Stuart (Jim Fyfe, left) and Cyrus (Chi McBride). Many lighting tests were done of the actors playing the ghosts, though, as Jackson notes, "They were to always have this translucent quality — and be illuminated from within as well."

here and I like working here," says Jackson of the selected locale, "but the obvious key advantage is that everything costs less and we could get the best people because we had the best rates. And because we're a bit isolated from the rest of the world, we're excited about taking on new challenges. So this was an *exciting* film to make, rather than a *crazy* film to make."

Joining in for the thrills was cinematographer Alun Bollinger, who had previously photographed *Heavenly Creatures*. Described by Jackson as one of New Zealand's most experienced and respected cameramen, Bollinger also functioned as camera operator for the first six weeks of the *Frighteners'* shoot until he was sidelined by a serious auto accident. Motion-control/Steadicam operator Richard Bluck stepped in for a time until cinematographer John Blick was brought on board.

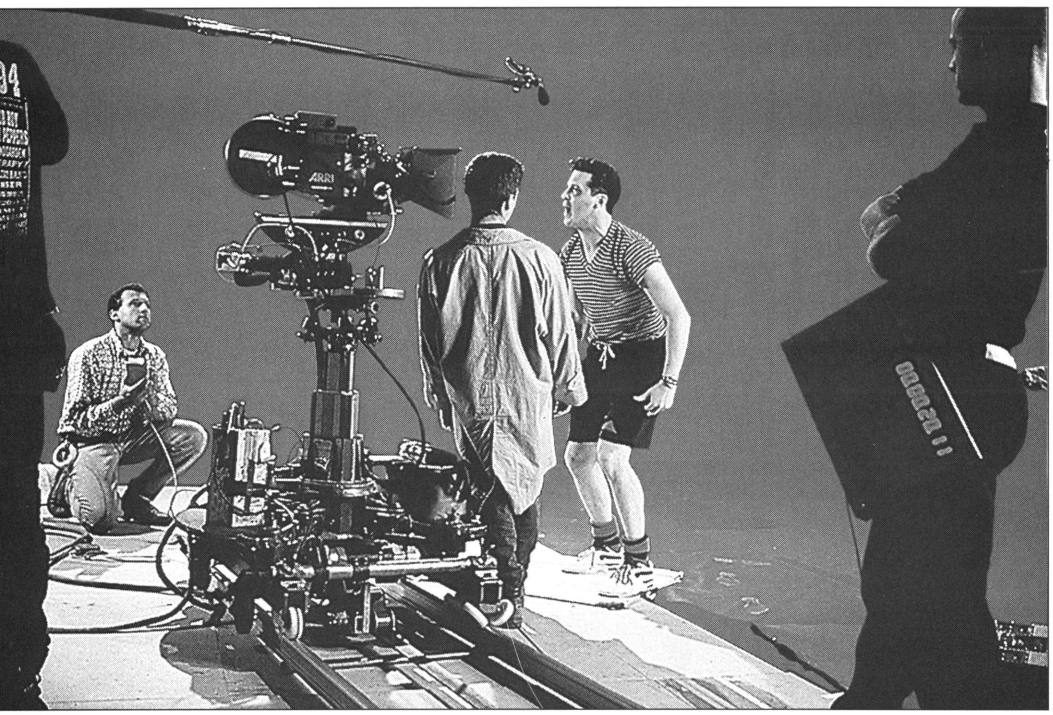
Ironically enough, Blick had recently bested Bollinger at the New Zealand Film and Television Awards, beating out the latter's nominated efforts on *Heavenly Creatures* with his own photographic work on a feature entitled *The Last Tattoo*. Recalls Jackson, "Alun joined us again after he recovered, but rather than lose John, we kept them both on, ending up with two directors of photography. So the film is ultimately a shared thing between them, with John also directing the second unit."

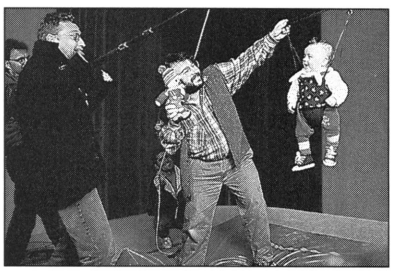
Says Bollinger, "We began by leap-frogging scenes, but by the end, some of the final sequences were very much shared between the two of us. We'd look at each other's rushes and go from there, although the process sometimes bogged us down because we were also sharing Peter."

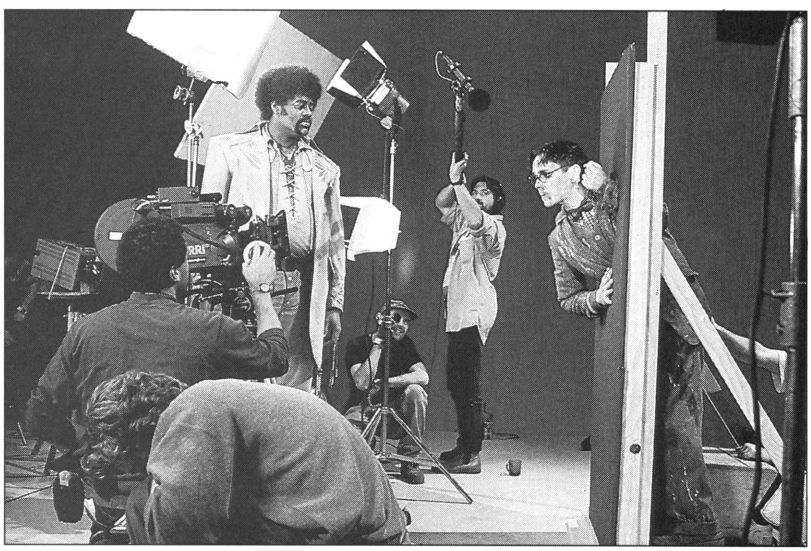
Bollinger got his start at a local television station, "which meant they put a camera in my hands and told me to go out and shoot news," he says. He grew up with the expanding New Zealand film community by shooting documentaries and dramatic features. "As this is a small country, there isn't the kind of hierarchy you find elsewhere," he describes. "I've operated and filled most every other position on a film set. I think that [kind of experience] gives you the proper perception of other people's problems."

John Blick started out as a sound recordist at the National Film Unit (NFU), but soon began to think that cinematography would be a more interesting profession. After some initial experience as a cameraman at the NFU, he worked on a number of TV series for the Australian Broadcasting Corporation. He later traveled through Asia as a director-cinematographer on commercials and documentaries. After directing commercials in the United States from 1986 to 1990, he returned to New Zealand to concentrate on cinematography while also working on screenplays. Says Blick, who is preparing to direct his own feature next year, "There's a lot more happening in New Zealand now than there was before I left, in terms of both indigenous features and those from overseas. Jane Campion really helped kick it off with *The Piano*, and now new people are appearing, like Peter and Lee Tamahori [the director of *Once Were Warriors* and *Mulholland Falls*]."

Surprised by the call to replace the laid-up Bollinger, Blick "flew down to visit Alun in the hospital, and we had a talk about the lighting and which filter packs he was using. The next thing I knew I was trying to catch up like







The Frighteners' *bluescreen stage shoot ran concurrently with the first unit.* Above: *Harry Harrison's backyard-built motion-control rig tracks along with Fox and co-star Peter Dobson. Says Bollinger, "Harry really tuned up his gear so we could operate a shot as if we were just using a regular camera on a dolly."* Top right: *Jackson elicits smiles from one young performer while Fyfe and McBride (bottom right) show that walking through walls is easier said than done. Flat, soft lighting on the ghosts proved best for the digital artists.*

crazy. I thought the job would only last a month while Alun recovered, but it really took two units to get through the material."

Capturing Phantoms

Says Jackson, "We shot *The Frighteners* in Super 35, which we had previously used on *Heavenly Creatures*. I really like the format, as it's a way of ending up with a Cinemascope-looking film without having to shoot anamorphic. You also have a lot more freedom in your choice of lenses."

Concerned with the eventual video and television versions of his widescreen pictures, Bollinger used a ground-glass screen he had previously designed to aid him in creating composition that would work for both 2.35:1 and 1.33:1. It has since become the standard in New Zealand. "I spent a lot of time with pieces of acetate with lines drawn on them before I found the best compromise between the two formats. But in Super 35 you're using the full gate, so you can actually re-format things for TV later."

The production gear was supplied by Film Facilities, the largest rental company in New Zealand. "Our main camera was the Arriflex 535B," says Bollinger, "but we also used Arri IIIs, BL4s and a Fries Mitchell. Because of the compositing work, image stability was very important, and we always got good results from anything we received from Film Facilities — though we still always ran extensive tests. We had used the BL4 on *Heavenly Creatures* and found that we could get good steadiness even at high speeds by adjusting the pitch control — adjusting the way the claw grabs the film. But we didn't have to do that with the 535B. This was my first film with that camera and I really relied on my first assistant, Gerry Vasbenter, who was stretched because he was often responsible for several cameras and two units."

Says Blick of the 535B, "I had used it before on commercials and I think the swing-over viewfinder is great. It's also very quiet. We used a BL4 on my last picture and noise was always a problem."

As for their array of lenses, Bollinger recalls, "Our primes were all Zeiss, except for a Century 9.8mm, and we also had Cooke and Canon zooms. I didn't use the Superspeeds because I don't like working at lower stops, so I stuck with the standards, which have a maximum aperture of f2.2. Depending on the scene, I try to stay around 2.8 for lit interiors. Besides, some lenses become a *wee* bit unreliable when you start to work at their extremes. The computer guys want clean edges so they can pull mattes, and the Zeiss lenses do give you a good sharp image.

"Depth is generally not an issue with the wider lenses, and if you want to limit it you can always throw neutral density filters on the lens. On exteriors where I have loads of daylight, I'll often use NDs."

Lab work was performed at The Film Unit in Wellington, a

New Zealand's New Digital Age

Peter Jackson's ghostly experiments on *The Frighteners* set the stage for an elaborate remake of *King Kong*.

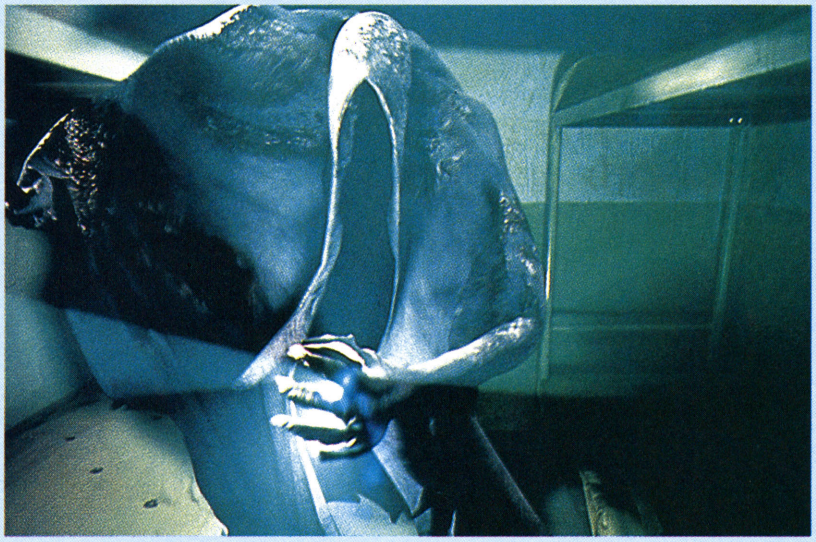
by Ron Magid and David E. Williams

"I'm pretty unlikely to make any films that don't have some special effects," admits director Peter Jackson. "And now even more so than before, because I have gotten into the digital realm. I think the computer is the best invention since the camera, which has been around for a 100 years."

Jackson's *The Frighteners* is a supernatural thriller with a wicked sense of humor and lots of ghosts. Although financed by Universal Pictures and executive-produced by Robert Zemeckis, the director opted not to go completely Hollywood and hire an effects house to create his ectoplasmic ensemble. Instead, like George Lucas did to create *Star Wars*, he decided to build his own effects house by expanding Weta Ltd., the one-man unit Jackson set up to produce *Heavenly Creatures*' 30-odd CG effects shots.

"I kind of used that movie as an excuse to get some computer gear," the filmmaker confesses. "Computers were starting to become a more important effects tool, but I was aware that by living and working in New Zealand I was at a tremendous disadvantage in terms of ever getting to use CG technology unless I just took it upon myself to get involved with it. In the script for *Heavenly Creatures*, there were some fantasy sequences and things that we thought would be good opportunities for CG. So really, it was kind of an excuse for me to go out and buy some of this gear, have the film budget pay for it, and then learn how to use it. We bought a Silicon Graphics computer, a scanner and a film recorder so we could take the shots into the computer and get them out again. That and a little software got us going. The experience allowed me to get a basic understanding of technology and not be afraid of it anymore. *The Frighteners* was a film that called for a huge amount of CG work. But it was just a matter of taking the basis we had and expanding it many times to cover the shots we needed."

With Universal's help, Jackson added some 50 workstations to New Zealand's only CG house. It made sense, since the director intended to shoot *The Frighteners* in his native land. "I wanted everything in close proximity so I could have a much greater hands-on involvement in the effects than if they were farmed out to the States. Every day, I went around to everybody's machines, talked to them about their shots and checked out the animation."



The murderous Grim Reaper steals another soul. The fully CGI character offered unique challenges to the Weta Ltd. effects team. They incorporated various texture-mapped fabrics to create his flowing hood and cloak.

Thanks to this setup, Jackson had a luxury that few filmmakers other than Lucas have had: he didn't worry about how many shots Weta was doing, only how long they took. During its 18-month schedule, the company pumped out some 400 to 500 digital effects shots. "In Hollywood, if you want to add shots, then the studio has to approve more money," explains Jackson. "But we didn't structure Weta like that. So if we had a great idea, it was no problem to suddenly add another four or five shots."

Augmented by CG effects, the bulk of the ghosts in the film are actors under excellent prosthetics designed by Richard Taylor (*Dead Alive*, *Heavenly Creatures*). Oscar-winner Rick Baker contributed a startling makeup for the moth-eaten Judge (John Astin), who's hung around so long that even his ghost is starting to fall apart. But when the Judge loses a jawbone to his ghost dog, Jackson wanted his chin to dangle loosely, an effect that even Baker was hard-pressed to create. Weta came to the rescue, replacing the lower half of Astin's face with a CG model minus a jaw. They also replaced Astin's torso with a bony CG spine and ribcage for scenes in which the Judge removes his coat.

Weta then added glowing auras surrounding all the ghosts and designed software to make the background warp behind their translucent forms. CG also enabled Jackson to create a villainous ghost (Jake Busey), who was rendered entirely in black-and-white except for his piercing blue eyes — which Weta's artists hand-painted frame by frame.

"This possibly would have been achievable through some optical means before digital effects," says Jackson, "but CG just makes it faster and easier. Speaking as a filmmaker from New Zealand, in the days before CG, when everything was done with

bluescreen mattes and such, it was impossible to do any of that stuff here. I never had any matte shots in any of my films before *Heavenly Creatures* because of the [lack of] technology in this country. Only the laboratories in England and the U.S. could do that kind of work. And it was a process where unless you did it really, really well, it looked terrible. So that limited what we could put into our scripts, because you had to think, 'Gosh, how are we going to do this? We're going to have to use rubber or models because we *can't* do bluescreen.' But we can do the best bluescreen mattes in the world now. And we have all that in a little plastic box! So we have leapfrogged over an entire generation of technology."

A pivotal influence on many filmmakers' careers, 1933's* King Kong *will be remade by Jackson — starring a fully digital Great Ape.

In fact, several *Frighteners* characters were created entirely in CG. The most demanding of these was the Grim Reaper, a bodiless figure in a hooded cape whose fingers are formed from the cloth trailing off his cloak. Jackson tried doing some shots using an actor in costume, but they never approached the unsettling predator the director envisioned. Ultimately, the Weta crew wrote special software to realistically render the Reaper's cloak so it swirled around or hung in folds like real material. "Nothing matched the creepiness of that CG figure," Jackson says admiringly.

Notes the director of the film's Super 35 format, "The format's better for the computer compositing work because you can do all your scanning with a flat image rather than a squeezed one. But another thing that I want to point out is that none of our digital effects shots were shot in VistaVision or anything like that.

"With the quality of the film stocks, scanners and outputters you have now, you just don't lose any [resolution] at all. But another of the terrific things about Super 35 is that if there's any difference in terms of color or density between a drama shots, it can be worked out [when the footage goes] through the final IP process."

In the past, Jackson's own effects talents enabled him to create images which, if they weren't technically superior to Hollywood's, were often far more inventive. Now, by creating a state-of-the-art CG effects house at home, the filmmaker has leveled the technical playing field.

Jackson's next project also figures to be an effects extravaganza — a remake of *King Kong* for Universal, a project which he initially turned down. "[The original] *King Kong* is the reason why I'm making movies," he attests. "I saw the 1933 version when I was 12, and it made we want to become a filmmaker. It's my favorite film of all time, so I have to admit that I never had any ambition to do a remake of it. But, we all know what happened [with the first remake] in 1976, and I thought, 'Universal is going to go ahead with this without me if I don't do it.' So I figured that maybe this time the remake should be done by someone who actually loves and respects the original movie. It sounds a bit silly, but I agreed to do it almost out of a sense of duty! I knew I could do something that didn't in any way damage the mystique of *Kong*. And at the end of the day, whatever we do isn't going to make the original film any less great. After ours is released, it will *still* be one of the great films of all time."

He enthuses, "We're going to spend the next year developing CG gorillas and dinosaurs and all sorts of stuff. Enormous advances were made [in creating CG hair] on *Jumanji*, but dealing with the fur on *Kong* is going to be a huge challenge. Another of the problems at the moment is coming up with a technique that will keep the rendering time down for the CG images. It can take hours for single frames to be completed now. And with all of the detail of hair and fur, it's going to be something we have to deal with. But that year is a luxury that I'm really pleased we have — it's going to make the film much better. With the technology we have, there is certainly the opportunity to do a mind-blowing version of *King Kong*." ◆

long-established house that had began as a government-run facility.

Spectral Lighting

Remarks Jackson, "*The Frighteners* is essentially a horror movie, so there's a lot of stylized lighting, but the feeling we wanted to generate was one of realism. We wanted the audience to believe what was going on in this small town. Although there are all of these ghosts around, we didn't want to overtly point to the fantasy element."

Says Bollinger, "We had several round-table discussions during preproduction so we could cross-reference between Peter's intentions and those of myself and the art departments. Lighting is only part of the look of the picture. I want to reflect the director's intentions in terms of mood, but I also want to build upon what the production designer is doing. There's no point in lighting a scene in conflict to the mood of the set.

"For example, we have scenes in Frank Bannister's house, which is under construction and only partially completed. So I took advantage of that by lighting through the framework, which is a great opportunity to break up light and create shadows. That also suggests the temporary nature of the place, which becomes a style.

"In terms of colors, I'll usually go through a gel swatch book with the designer, the art director and my gaffer. That will sometimes lead them in certain directions. In one case, it influenced the colors they used for a set of stained-glass doors. Or it might influence my choice of gels.

"As the shoot progressed, it became evident that the film was becoming more frightening than I had expected. We were looking for a stronger style than standard straight comedy, and since we were shooting with ghosts in mind, we were always looking for mood, sometimes despite the content of the scene. And by the end of the picture, it gets quite dark in terms of mood, so we just *went* for it."

Shot primarily in an old convent school in Wellington, the finale has Bannister being chased through an abandoned hospital by both the Reaper and its shotgun-

Bannister confronts lunatic FBI agent Milton Dammers (Jeffrey Combs) in the nighttime, present-day hospital. The blue-green colors and exaggerated shadows fulfilled Jackson's desire for stylized yet realistic "horror film" lighting. It also offered a complete contrast to the period, daylight-look hospital (see following page).

wielding, sociopathic human accomplice. Through a supernatural plot twist, our hero becomes "unstuck in time." As a result, the hospital alternates between a clean, period daylight look and a present-day nighttime state of dilapidation. The respective lighting is equally at odds, changing from an institutional brightness to a shadowy blue-green.

In describing the two worlds, Bollinger says, "We were going for complete opposites and tried to keep the lighting in the daylight hospital creamy white — almost overlit — while on the nighttime shots we used a mixed filter pack, mostly a steel blue. Most of the switching was done in editing, but we also designed lighting transitions to be done within shots. For instance, a character might be chased through a darkened corridor into a fully lit, daylight room."

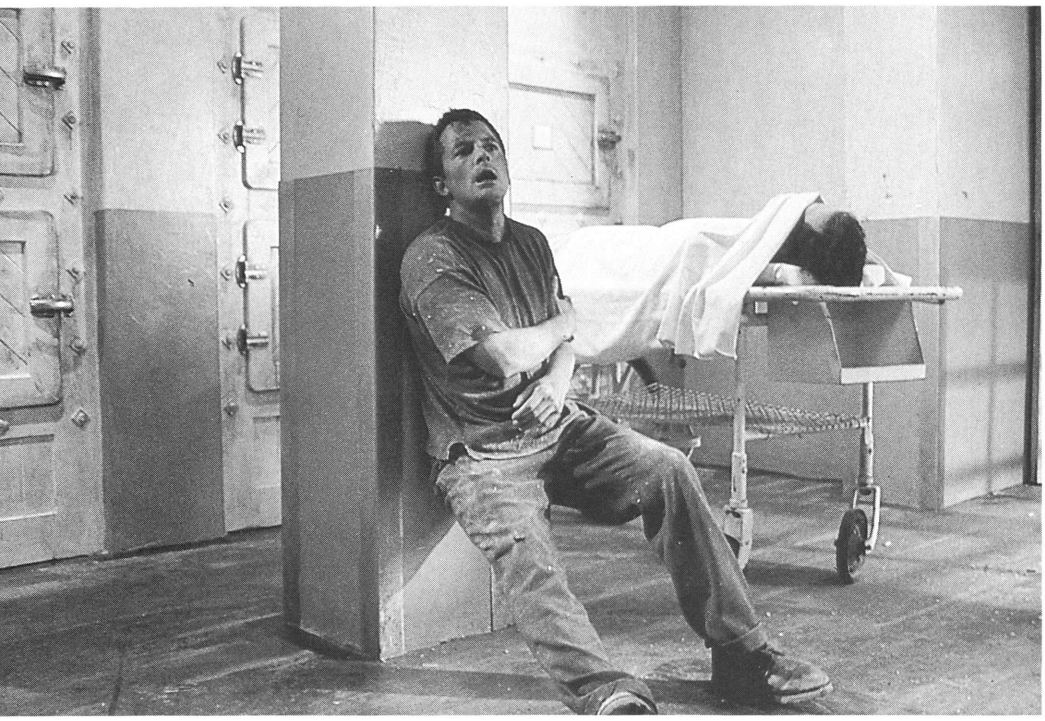
The use of crossfading fixtures, perfect timing and choreography were essential to the success of this effect. Recalls Bollinger, "It was a technique we used once on *Heavenly Creatures,* and I think Peter saw the potential to use it again and build on the idea. *Tucker: The Man and His Dream* [shot by Vittorio Storaro, ASC, AIC] is a film that has a lot of terrific transitions like this."

However, Jackson's penchant for wide lenses left little room for lighting fixtures. "I knew what to expect," says Bollinger, alluding to his experiences on *Heavenly Creatures*. "Not only would we often be using a wide-angle lens, but the shot could well be from close to the floor and we would cover a lot of the set with camera movement. You have to be cunning about it and find a sliver of light coming from out of a closet, behind a corner or wherever. Ambience coming from windows becomes more important."

Admits Blick, "I had watched hours of rushes and found the case to be, 'If you can hide a light, hide it.' Peter likes using the 24mm pretty much all the time, and he also likes to use Steadicam. Unlike Alun, I like to to use large, soft sources and design my lighting to apparently come from existing sources. This was not initially possible, but once I talked to the production designer, he found ways to include more practicals and make some of the walls and ceilings readily movable for lighting."

A scene that illustrates the lighting dilemma is one in which Bannister is interrogated by an overzealous FBI agent (Jeffrey Combs). Says Blick, "Jeffrey was very pale and fitted with black contacts, so I usually lit him from overhead, and a little hot at times to make his face even more gaunt and spooky. The interview room was only about 8 by 15 feet and we shot that scene primarily with the Steadicam, or handheld on a 24mm or 16mm lens, sometimes only inches from his face. There was a window to come through, but we also hung an overhead soft box with a black skirt to keep the table in the center hot. To fill a bit, I rigged a little 24-volt bulb in a paper cup with a dimmer. It had to be lightweight as I mounted it to the front of the Steadicam. We blocked the scene, but Peter often lets the actors go and you have to be ready; the small bulb helped me to get some light into Jeffrey's eyes."

Practical lighting would be the obvious answer to this dilemma, but as Bollinger notes, "There were various fixtures in the scenes, but they weren't really doing the lighting job. Because of the



Due to his flirtations with the afterlife, Bannister becomes "unstuck in time" — unpredictably traveling back and forth between present-day and past versions of the hospital — while being chased by the Reaper. While most of the switching was done in editing, lighting changes were also done within shots with cross-fading fixtures. Bollinger notes that the art direction aided in creating the creamy daylight-look for the period sequences.

computer department, we were using [Kodak 100 ASA] 5248 and [200 ASA] 93 for anything involving effects work, so we couldn't get enough out of practical sources."

Details Blick, "We could use [500 ASA] 5298 if there were no effects, though we didn't want to make it *too* easy for ourselves. But there was also the issue of contrast. In Super 35 you've really got to be aware of it, especially with 48 — when it goes black, it goes *black*.

"We were almost always wide open: the focus pullers were spoiled if they had an f2.8. I like to work with soft and confined light, however, because of the low speed of the 48, I couldn't use Chimeras on Fresnels with McGrids as much as I wanted to. I did find Pars and Chimeras quite useful, but generally I was unable to light as softly as I would have perferred. It was usually a matter of focusing intense sources in pools just to be able to expose the film. We used a lot of Fresnels, and some flagging to keep light off the walls."

Ghost Chasers

"With any film that has about 500 effects shots, there's going to be an impact on your photographic style," says Jackson, addressing the question of how the precise demands of elaborate compositing impacted his trademark camera moves. "I wanted to keep my style intact, so we shot a lot of the ghost scenes with motion control, which made them even more time-consuming. What saved us, though, was a system that a New Zealand grip named Harry Harrison had built. It's very lightweight and portable; it only took about 30 to 40 minutes to take it out of the truck and get it set up."

Says Harrison, "I've always been interested in motion control, and there was none of any kind available in New Zealand. I'd visited the States and Europe and seen all these big rigs they use, but they all seemed rather studio-bound. You had to take the job to the machine, and there was all this scientific alchemy that had to be done. My idea was to utilize existing equipment to build a system that could be used in the field and could be reasonably flexible to the demands of everyday filmmaking, rather than being preoccupied with degrees of perfection and engineering elegance."

Harrison, in turn, credits Kuper Systems, which supplied the software, interface and electronic boards for his mechanical design. He adds, "What it really boils down to are Arri or Moy heads, a modified Elemack Cricket dolly, various cranes and a whole bunch of specialized wheels and driver units that could be bolted onto these basic components to make the system function as an accurately drivable machine."

Harrison compares his invention's wheel-driven operation to that of a geared Panahead. "It's principally a recording device where all of the controls are dependent on hand-eye coordination and human error," he says. "It then repeats that action. And because you aren't using the computer to design shots, you don't get those totally smooth moves that tend to give away motion control."

Before being used on some 250 setups over 10 months of service on *The Frighteners*, the rig underwent a week of tests in conjunction with the CGI department. Harrison's unit "proved to hold accuracy. The test moves were very elaborate with a lot of shake, yet it seemed to make the same shakes and wobbles each time. When it came time to do composites with our test passes, everything held together very well."

Asked to describe the image accuracy of the machine, Harrison says, "We could probably run 50mm lenses and not worry about match holding. Once you get into the 70 to 100mm range you have to be much more cautious."

For tracking shots, the device runs on aluminum rails that are not unlike standard steel dolly rails. "I wanted it to be compatible so we didn't have to set new tracks every time we needed a motion-control shot," says Harrison. "The drive system uses an industrial toothed belt — like the timing belt in a car — that runs the length of the rail. The dolly runs up and down that, working like the carriage on a dot-matrix printer, except that the motor is on the dolly itself."

Raising Spirits

"The actual look of the ghosts was a concern from the beginning," says Bollinger. "Peter was quite clear that they should be transparent, and in the final version, they're quite desaturated of color. We started our experimentation from there, and a lot of the lighting and camera tests we did were also intended to generate material for the computer guys to

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start working on. We did some with still cameras loaded with various stocks, just to give them a frame to see what could be done with various degrees of transparency, tones and grain patterns. That would help determine where makeup and wardrobe were going. When you're dealing with someone who is semi-transparent, contrast and colors become very important, as they will be changed in the process.

He says of planning the bluescreen shoot, "A lot of time was spent getting a system established. How were we going to synchronize everything once we got on the set? We wound up creating new terminology and roles for people. We had to design and build a bluescreen stage, and ended up using curtaining on a raised stage. But the heart of the system was the real-time compositing system, which became known as 'the Starship.'"

Describing a typical ghost effect setup, Bollinger details, "We would first block the scene normally, with all of the actors on the actual set. We'd see the action, determine if a ghost was going to walk through a wall or anything else, get our timing and then do what we called a 'hot recording' on video. That goes down on tape and the motion-control unit records the movement. Now, that can be played back with time code driving everything. So the ghosts exit and the live actors play the scene alone with us going for takes on film. The sound man then mixes in the ghosts' pre-recorded lines as they come up. So when we hit the bluescreen stage, we had the video and audio references, the selected film take *and* the motion-control information in order to re-create the scene. With each take, the Starship Captain, as we called the fellow operating the compositor, would then do a live mix to see that everything was working in sync.

"Another important stage in the process was what we called the 'measure up.' After shooting a scene on the set or location, we would get very accurate measurements of where the camera and track were, and where any relevant furniture or doorways were. That way, we could precisely re-create the scene on the bluescreen stage."

The survey also included lighting information, but as Jackson explains, "We lit the actors playing the ghosts fairly flatly. Also we weren't worried about matching their lighting to the lighting in the room because our concept was that they were illuminated from within. The computer effects did the rest."

Confirms Bollinger, "The lighting got simpler as we went on, which is often the case. And while we thought it was going to be quite difficult to light the actors playing the ghosts, it was very simple."

The bluescreen itself was lit with tungsten cyc lighting gelled with 363 blue for good saturation. Bollinger has a preference for greenscreen, since "you get more light back off one, but the computer guys' programs were better set up for blue. On *Heavenly Creatures*, we had experimented with blue, green and red screens, but the decision here was dictated to us by [the computer effects team]."

"We also rigged the top of the cyc with backlights for sharper separation," says Blick, "and the floor was covered with Mylar, which reflects the blue background pretty seamlessly. But it was very difficult to keep reflections out of it, so we had to do a lot of flagging. Also, we had to be careful to avoid putting creases in it or we'd get these spectacular highlights."

He adds, "I was very lucky to come in after a lot of this process was figured out. The lighting was simple, but this part of the shoot was very difficult for both the actors and Peter, for obvious reasons.

"I enjoyed working with Peter, he knows his special effects, lighting, lenses — he's very specific and has his own original style."

Contemplating Jackson's roots as a many-hats filmmaker, Bollinger concludes, "Pete's involvement in the camera department is pretty well illustrated by the morning I had my accident on the way to the set. He got behind the camera himself and did a couple of shots before they even knew what had happened to me. One of the pleasures of our relationship is working with someone who knows his craft." ◆

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Right: ***Curled up with a book, Matilda (Mara Wilson) casts a disdainful eye upon her blustery, lowbrow parents, Harry (Danny DeVito) and Zinnia (Rhea Perlman). Lower right: On location at "Crunchem Hall," DeVito and Czapsky plot out a 360-degree shot that will simulate the POV of a little girl being swung around by her pigtails.***

Book Smart

Roald Dahl's *Matilda*, a pitch-black fable about the magical value of reading, is rendered in comic-opera style by director Danny DeVito and cinematographer Stefan Czapsky.

by Stephen Pizzello

At the Los Angeles Arboretum, located next to the Santa Anita horse track in Arcadia, California, the cast and crew of *Matilda* are sweating out a scene. Literally.

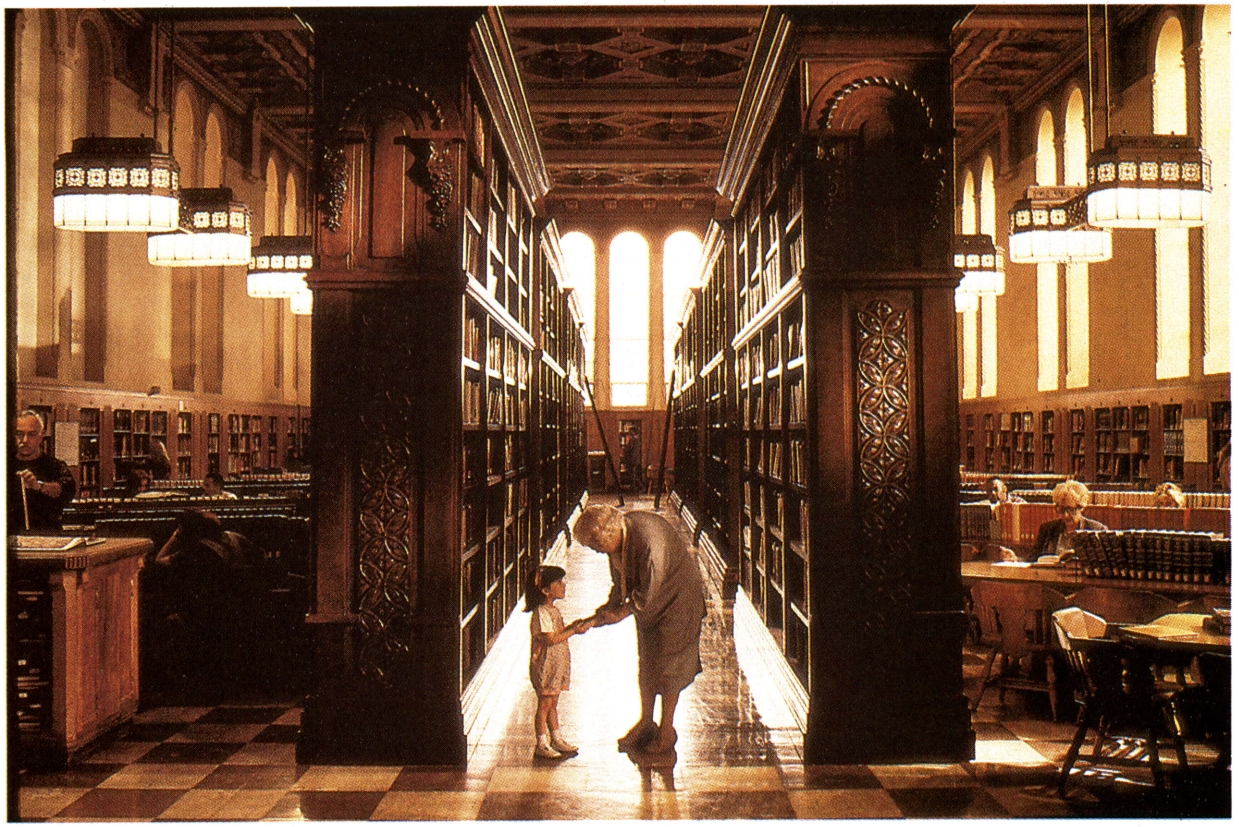
It's mid-August, 1995, and temperatures have soared past the 100-degree mark as the production team prepares to shoot a schoolyard sequence on the grounds of the fictitious "Crunchem Hall." There, a gaggle of children will watch in horror as their evil headmistress, Miss Trunchbull, grabs a classmate by the pigtails and tosses her, with perfect Olympic form, over a spiky wrought-iron fence and into the field of flowers beyond.

The scene may sound like a grotesque tableau, but it plays like a live-action version of an Edward Gorey illustration, with the malevolence tempered by a slyly satirical bent. The setting could best be described as "cartoon Gothic" — the gray, grime-streaked school building and its decrepit play area wouldn't look out of place in a Hammer Films frightfest. Beyond the perimeter of the gloomy-looking fence, however, peacocks saunter through the flower patch, peacefully oblivious to the slapstick antics taking place just 30 yards away.

This air of absurdist exaggeration is heightened by the actual staging of the sequence. As Trunchbull, the former Olympic hammer-thrower turned proto-Fascist principal, British actress Pam Ferris — encased in a well-padded, suffocatingly hot body suit — cuts a hilariously imposing figure. Her hair compressed into a mean little bun, Ferris is decked out in a cartoony, Communist Bloc getup, complete with a forest green, leather-belted tunic, thick knee socks, mountaineer's boots and a riding crop — she's a vision of Teutonic torment. Between takes, though, her adorable blonde victim, bespectacled and clad in a tiny jumpsuit, is having a grand old time. Suspended from a crane-and-wire rig that will help loft her into the air, she squeals with glee as crew members playfully bat her back and forth like a live piñata. When shooting resumes, the action is played out in low angles to emphasize Trunchbull's bulky menace. To add to the scene's parodic feel, later shots of the girl sailing through the air, pigtails flapping, will be filmed as pointedly obvious special effects composites.

As the crew lines up for yet another take, actor-director Danny DeVito surveys the situation from the shaded safety of a small tented enclosure. Dressed casually in a batik-style, short-sleeved shirt, tan khaki pants, hipster shades and a *Matilda* baseball cap, the filmmaker cuts a cheerfully comic figure of his own, puffing on a cigar as he gratefully accepts a neck-rub from a sympathetic assistant.

"I've been doin' this for 30 years, and I've always loved coming to work," he says, his Jersey-accented voice betraying a hint of battle fatigue. "But let me tell you, I'm sick of this location. I feel like somebody's dropping an anvil on my head. I can't wait to get back to the studio; I'm never shooting a day exterior again!"



Photos by Francois Duhamel, courtesy of Columbia/TriStar Motion Picture Companies

Matilda finds sanctuary from the numbing effects of suburbia in the local library. The scene's warm, natural look was actually produced by a large array of Condor-mounted 18Ks and 12Ks placed outside the cathedral-style windows. For other library shots, Czapsky made extensive use of Molepars, as well as low-voltage lights to simulate sunbeams.

Sensing the need to buoy his crew's spirits, DeVito grabs a microphone and adopts the gruff, sardonic tone of his most famous character, the irascible, cabby-tormenting dispatcher Louie DePalma from the classic sitcom *Taxi*. "OK, *losers*, get your butts in gear!" he bellows, prompting a round of laughter.

The on-set camaraderie (along with some top-notch catering, another perk of working for DeVito) has somehow transformed sweltering, nearly unbearable conditions into an enjoyable working environment. During a break in shooting, director of photography Stefan Czapsky confirms that DeVito's personal style yields positive results. "In addition to being a nice guy, Danny is familiar with every aspect of film production, and he really put his stamp on this project," says Czapsky. "He's a real director. He thinks about the material a lot, and he puts together these thick books full of his ideas. If you ask him about a scene, he'll tell you exactly how he wants it done, even if it involves 50 different shots. It may be incredibly complicated to achieve, but he's clear about what he wants. At the same time, he does leave space for you to be creative; he's not a dictator."

Certainly, DeVito is an ideal choice to direct this screen version of Roald Dahl's well-known children's book, which tells the tale of a precocious 8-year-old girl (Mara Wilson) who has embraced the world of literature to escape from the horrid people who surround her. In addition to Miss Trunchbull, Matilda must contend with her abhorrent, anti-intellectual family, the Wormwoods. Her father, Harry (DeVito), is a sleazy, abrasive car salesman who swindles unsuspecting customers; her tackily dressed and outrageously coiffured mother, Zinnia (played by DeVito's real-life wife, Rhea Perlman), epitomizes suburban sloth with her addiction to bingo, game shows and chocolate eclairs; and her older brother, Michael, is a blockheaded bully.

However, Matilda does have an ally in Miss Honey (Embeth Davidtz), a sweet-natured schoolteacher and the beleaguered niece of Miss Trunchbull — who, we discover, murdered Miss Honey's father to inherit his Victorian home. With the help of some supernatural powers she has developed through reading, Matilda is eventually able to mount a successful revolt against the tyrannical Trunchbull, and even finagles her adoption by Miss Honey.

Like the author of this eccentric tale, DeVito has a darkly comic worldview that often borders on the perverse. In the past, his twisted directorial sensibility has made for some memorable moments of cinematic anarchy in such films as *Throw Momma from the Train* and *The War of the Roses*, but his resumé also includes the brooding political drama *Hoffa*. In discussing his major filmic influences, he rattles off a roll call of major talents. "My favorite directors are guys like Welles, Kubrick, Lean and Fellini," DeVito says. "I like what they did with the camera, and I think that style of shooting really works with a story like *Matilda*. It's a modern fairytale with some really extreme characters, and to me, those characters dictate the approach. This is not a sweet, simple film; I didn't want to shy away from the darker stuff in the story."

Helping DeVito to achieve his engagingly demented vision was Czapsky, who joined the

Above: ***A remote camera hovers over the exterior of Crunchem Hall (an existing edifice at the Los Angeles Arboretum) as children gather for a group scene. DeVito and Czapsky, both fans of epic filmmakers such as Orson Welles, employed many wide angles and sweeping camera moves on*** **Matilda. Right:** ***Miss Trunchbull (Pam Ferris), the headmistress from Hell, forces a corpulent student to consume an entire chocolate cake as his classmates cheer him on. The filmmakers sought to lend the classroom a dungeon-like, Gothic feel.***

project when delays prior to production forced the director's usual cameraman, Stephen Burum, ASC, to bow out and fulfill his commitment to the summer blockbuster *Mission: Impossible* [see *AC* June 1996]. In Czapsky, a native New Yorker, DeVito found a kindred spirit. The cinematographer's past work includes an array of intelligently offbeat projects, including the underrated *Vampire's Kiss, Last Exit to Brooklyn* and a trio of films with the decidedly unconventional Tim Burton (*Edward Scissorhands, Batman Returns* and *Ed Wood*).

Says Czapsky, "Roald Dahl's books are a modern phenomenon of classic literature. When my kids were reading them, I would catch them cracking up, laughing so hard they couldn't stop — to the point where it was disturbing to me, and I had to know what was so funny. Dahl's book are very irreverent toward language, and parents, and other things that kids respond to. What made this such an interesting project is that the book is about the power of language and the written word; the imagination is the important thing. In the story, television and movies are like a bad drug. So it's odd to make a visually interesting movie with a theme that's really kind of against that type of entertainment."

During preproduction, DeVito and Czapsky had lengthy discussions about the look of the film. "Danny has a unique visual sensibility," Czapsky offers. "Working with him is what I imagine it might be like working for someone like Fellini, with all of that wild visual imagery. Danny has a strong visual perception of things that's also a little distorted, and sometimes borders on the grotesque. He wanted to be true to the book, and I think the way he's chosen to interpret it is very close to the way it was intended to be.

"I came onto the picture late in the game, but I had about four or five weeks to prep," he continues. "Danny had already thought out the entire movie, so I basically listened to his ideas and acted as his sounding-board. He's a big fan of opera, and he had everything planned out on a grand scale."

In order to achieve that sense of grandeur on the screen, the duo made several key choices with regard to the film's format, stock and lenses. The director initially suggested that the film be shot in anamorphic, but as he detailed some of his other notions about the film's visuals, Czapsky began to think that Super 35 would be the optimum format. DeVito wanted the film's colors to pop out and he also favored a crisp, wide-angled look. "As we talked about those ideas, I realized that the movie Danny wanted to make could be better achieved with spherical lenses," says Czapsky. "Super 35 gave us a wider choice of lenses and more depth of field. I felt that I could do more interesting photography in that format; plus, there were scenes with a lot of kids in the frame, and I thought I would need the extra depth of field. But I had never shot in Super 35, and I was still a bit ambivalent about it. Sometimes to me 1.85 seems bigger than anamorphic when I'm watching a movie in a theater. It just seems to have more screen presence; with anamorphic, the top and bottom of the frame are often chopped off in the theaters."

Czapsky's decision to shoot the entire film with Kodak's 100 ASA 5248 tungsten-balanced stock helped cement the duo's decision to go with Super 35. "I basically told Danny that the combination of the slow film and the availability of lenses for Super 35 — especially the 10mm — would allow me to come up with something new that might break the mold. The depth of field would allow me to show a character up close in the foreground, plus some background action, without resorting to the usual, cookbook-style split-diopter stuff that you see so often. That type of shooting strikes me as

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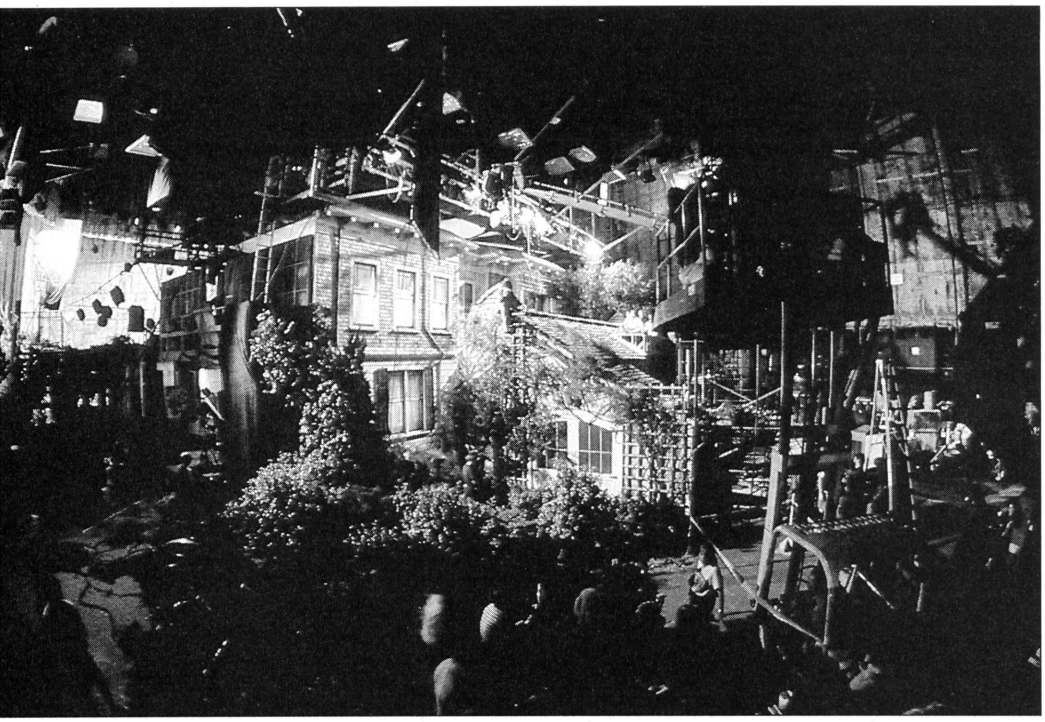

An elaborate full-scale mockup of Trunchbull's Victorian house was constructed on a soundstage at the Sony lot. In addition to the facade and greenery-trimmed courtyard on view here, the two-story interior/exterior set included a giant living room with majestic banisters and a huge bay window.

being a bit self-conscious, and it's also limiting, because you don't really have much of a choice when you're shooting in straight anamorphic. The split diopter has become a very trendy thing to use in both commercials and movies, but I wanted to avoid it.

"Essentially, I was going for a nice, crisp picture with interesting wide-screen photography, and I knew that the 48 would give me nice focus and the freedom to print things down. I didn't consider using higher-speed film, because I like the way the 48 looks on screen; it's really rich and grainless. I shot *Last Exit to Brooklyn* with high-speed film, and it looks good, but they didn't make many prints of that film; this film is going to be printed a few thousand times. Sometimes it's tough to shoot with an optical process [such as Super 35], especially when so many prints are being made; that's when it all starts to fall apart. Answer prints always look good, because they're coming right off the negative, but sometimes you have to admit to yourself that the picture is going to deteriorate a bit when it goes to release prints. It seems to me that the 48 gives the film's timers the most color control. It also holds up better through the various stages [in the optical process]."

Czapsky's gaffer, John Vecchio, says that only one shot in the movie, involving TV monitors, was rendered with another stock (5293). "In that instance, we were at the very end of the exposure scale," notes Vecchio. "I did *Ed Wood* with Stefan, and I learned that he's a big fan of very precise exposure control and trying to maintain the continuity of the various looks. Sticking to one film stock would help him do that. The choice was also based on Danny's desire to get a sharp, Technicolor-like look. That approach implied using a much greater range of lighting to get the stops that we needed."

Having lent his talents to such films as *Batman Returns*, Czapsky is no stranger to big lighting setups and complicated moves. He further notes that many of his own stylistic influences fall into the same category. "I practice a type of camera work that's really based on the classical photography that I've experienced as a viewer," he says. "When I was going to school, there was a big English influence on cinematography — lots of long-lens work involving stacks of filters and smoke. But I was more affected by the kind of wide-angle photography you see in films like *Citizen Kane* and *Touch of Evil*. I always liked classic black-and-white photography, stuff like *The Night of the Hunter* and *In Cold Blood*, and movies with big themes, such as Frank Capra's films.

"I do like to work with high levels of light," he asserts. "But even though I was working with a slow stock on *Matilda*, I wasn't working at a low stop; I was at an f4, 5.6 or 8. I judge [the exposure] with my own eye and sensibility. I shot at whatever I needed to have good focus; sometimes I couldn't have full focus all the way across. But if I was doing a wider shot and I wanted to go with a tighter lens and needed to bump the stop up for the focus, I would re-light it. I don't just work at one stop and make the crew set all the lights for that. Sometimes it's to my advantage to work [at high light levels], not only in terms of the focus, but because the base exposure won't be such a critical factor. The difference between 400 footcandles and 350 isn't as bad as the difference between 6 and 4 footcandles. So in a way, shooting at high light levels frees you up a bit. At low light levels, [those factors] are really critical and they can make the difference between whether something works or not. If I've got a lot of lights up, I'll suit things to whatever would be the quickest way for me to balance my lights out; if it's easier for me to make the brightest ones not so bright, I'll do that instead of bumping up all of the little units. I always pay very careful attention to my contrast.

"When you do the kinds of movies I do, the production can afford bigger setups and equipment," he concedes. "I've done smaller movies that didn't have those kinds of advantages, but given the choice, I prefer to work this way. There's a certain classical quality and beauty to the movement when you work in this mode, and when I add my lighting to it, it makes it mine. This approach to photography is based on a lot of work that was done by people before me, and I feel as if I'm continuing in that stylistic spectrum."

Of course, such large-scale shooting can become a logistical challenge on a film like *Matilda*, which involved, by Czapsky's estimate, more than 2,400 separate setups. "What was most complicated about this picture was staging things so that the actors would fill

out the wide frame — blocking things out and planning the camera moves," he says. "But I'm good at doing spontaneous setup work on the spot. On this picture, Danny would come in with his list of shots and we'd just try to achieve them. If we couldn't do it, we'd make some modifications. I like to work a bit like a musician in an improvisational situation; you make your decisions based on things that are happening around you.

"When I'm shooting, hundreds of lights are going up, and with the number of shots we had on this show, we had to move fast. But I'm used to working that way. I like moving the equipment and the actors around, and interacting with the director — building up the whole scene."

To speed up that process, Czapsky has a truckload of specialized rigging equipment — everything from motorized trusses to an array of booming devices. "I'm a custom lighter in that I can work the edges of my frame," he says. "My crew is really adept at installing equipment around the frame, which allows me to shoot and move around without restrictions."

Adds gaffer Vecchio, "The type of lighting we did on *Matilda* was almost theatrical in some ways. If we needed to put a light in a difficult place, we either used trusses up high off of chain motors, or we removed ceiling pieces from the sets and worked high over the top of the frame. Stefan does like to work very close to the edges of the frame, but he has a good range of equipment to get us there. For example, we used Arri booms quite a bit so that we could extend a nice backlight to somebody or float [a light] out over the frame."

To give himself even more freedom, Czapsky made frequent use of a Lenny arm with a remote head. "I wanted to have more freedom than dollying could give me," he explains. "So I'd set up the arm on a big track and follow the actors around. We did a number of tight shots that moved around and then widened out before going in tight again. Those scenes involved careful blocking, but we were always doing moving shots that we could cut into later so that Danny would have options in the editing room."

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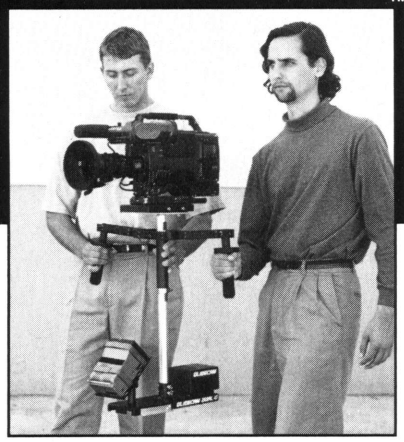

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Key grip John Cassidy notes, "Stefan has a basic technique which involves building a strong platform that we can put the Lenny arm on. Often the platform is constructed out of wood planking, and it's about 20 feet long. We'd put a Chapman dolly with a Lenny arm on that and use it to make smooth, quick moves in on people."

Czapsky mainly used tungsten instruments on the show — a selection of 10Ks, 20Ks, Maxi-Brutes and Par lights. "Very often, I was lighting with Par cans placed in big banks, like the 24-light Dino," he says. "When you're dealing with hard light [on this scale], you basically need to cover areas with spotlights. Sometimes you're lucky and you can use one big broad light, but usually you're putting up a lot of lights. You have to fight to keep your exposure right so that the actors aren't too brightly lit or too dark in certain spots, and you also don't want to have too many shadows.

"When we were shooting outside, we were usually wide and often exploited the sun; we always wanted a big blue sky in the background to help us get that Technicolor effect Danny wanted."

In keeping with the picture's "bigger is better" aesthetic, Czapsky often found himself adding the widest lenses in his arsenal to his Panavision Platinum cameras — most often the 10mm, 14mm, 17mm and 21mm Primos. "I used the wide lenses more often because we wanted a big picture and because Danny likes that feeling of exaggeration. We were able to shoot things that we couldn't have done in anamorphic — like big foreground props with action in the background. I'd done a lot of wide-angle photography on *Batman Returns* and *Edward Scissorhands*, and I think Danny picked me for this job because I could give the movie a crisp, sharp look. It has to do with using the lenses without filters. I shot clean because I wanted to have the sharpest look possible before things got to the optical stage.

"In certain scenes involving Miss Honey and Matilda, I was trying to make things a bit more saccharine, so I would shoot the two of them with longer lenses. It was in contrast to the rest of the film, but the lighting kept it all together. I did occasionally use some diffusion on Miss Honey, like a low ProMist filter or the lightest Mitchells, but I preferred shooting clean on this movie."

The filmmakers also made use of a snorkel lens for situations in which DeVito wanted to emphasize the comic aspect of a scene — a super close-up of Miss Trunchbull's mouth, or shots of a newt that the children slip into their tormentor's water glass.

Czapsky's overall plan for the film coalesces effectively in major scenes involving the story's main settings — the Wormwood house, the library in which Matilda discovers her affinity for literature, Trunchbull's Victorian mansion, and the school.

The Wormwoods' residence — a typical suburban tract home — was built on a soundstage at Sony. "The house was designed to be in bad taste, because that's the way the Wormwoods are," Czapsky relates. "We tried to give it that feeling of 'New Jersey at its worst' — a tacky, showy suburban look. The set at Sony had a very low ceiling, about eight feet high, so I tried to give the interior a three-dimensional feel by using the 10mm and 14mm lenses a lot. I also tried to make the parents look a little scary; the lighting on them was contrasty and even a little ugly. I used scoop lights for that."

Vecchio notes that most of the fixtures used in the Wormwood home were "traditional movie lights — babies, or Smith-Victor scoop lights with standard bulbs and some 216 or opal on the outside. When Stefan slapped on the 10mm lens, you could see a lot of the ceiling; given his habit of working close to the edges of the frame, we tried to delineate the frame lines as closely as possible. We then removed whatever ceiling pieces we could and brought light in that way. Or we would hide lights behind people's heads or go for low-light situations. The low ceiling made that setup very challenging."

The gaffer added to the home's zombie-like atmosphere by creating a TV effect he dubbed "Matildavision." He explains, "I

had one of my electricians put together a foam-core box, inside of which we placed four MR lights — the kind you'd use for track lighting — and a reflector. We also added some diffusion outside the box. Each of the lights was on its own dimmer control, so I could vary the flicker on the family's faces. It gave us that level TV look with a little bit of movement. The challenge was to create a TV effect on all of these people sitting in the room. Using individual lights allowed us to aim light at a particular person, even if they were sitting further back in the room."

The filmmakers went to the opposite extreme in ambiance when shooting scenes in the library, Matilda's blessed refuge. Shot at UCLA, these sequences were designed to emphasize the magical allure of reading. "I tried to make the library seem almost like a church," Czapsky says. "It looked like a place that would nurture the human spirit — a big place of higher learning."

To create that feeling, Czapsky combined big banks of lights — either inside the building or on lifts outside the windows — with low-voltage units that could simulate smaller beams of sunlight. Vecchio says that Czapsky drew inspiration "from cathedral lighting and from Renaissance-style paintings. Stefan likes to balance very dark, inky blackness with streaks of light, and the low-voltage units gave us that element of control. They added a nice dramatic element to that sequence. When Matilda first walks into the library, we lit the interior primarily with 28- and 6-volt lights, along with Molepars, which are very spotty and narrow Par cans. Then for the faces, we would use a 4K soft light to try and get nice rim lights in the actors' eyes — Stefan calls it a 'catch light.'"

Particularly impressive is a God's-eye view of the library interior, which gazes down upon Matilda and a librarian strolling through the stacks. "It looks as if we shot with available light, but outside we had something like 10 Condors with 18Ks and 12Ks to pour light through the windows and get a nice sheen on the floor for the actors to walk through,"

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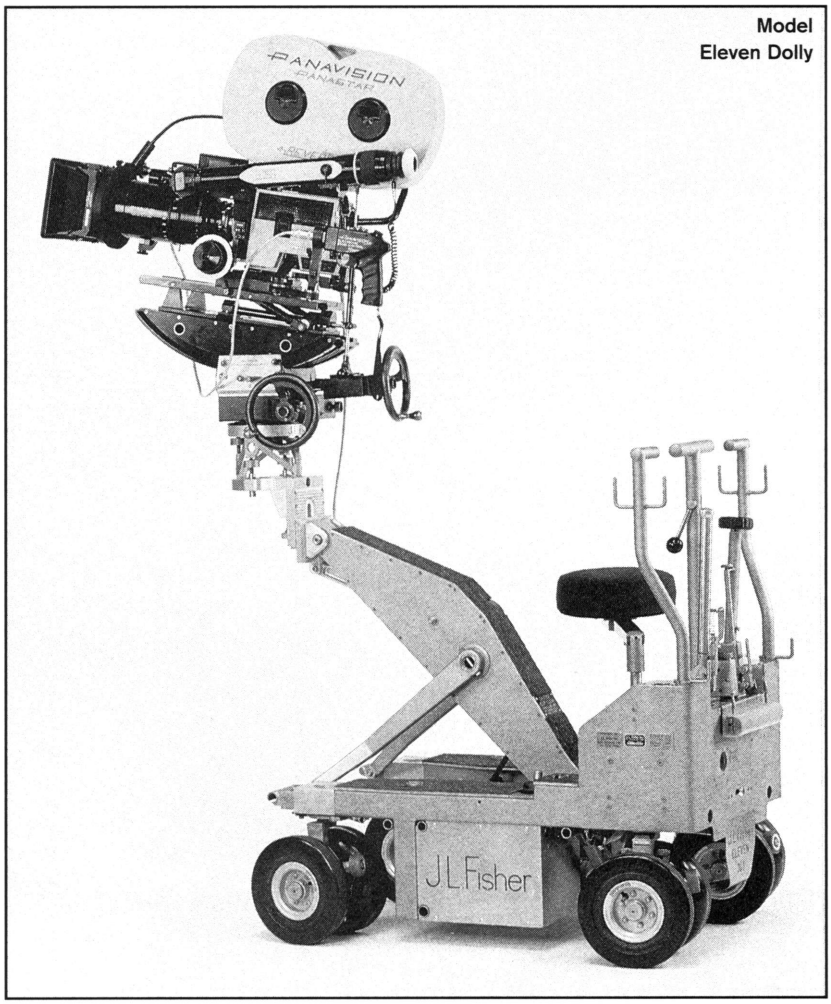

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Vecchio recalls. "It all looks very natural, but in reality it was extremely light-intensive."

Things take a more sinister turn in scenes set within Trunchbull's Victorian residence, a two-story mansion built on a stage at Sony. The elaborate set included majestic banisters, a huge bay window, a giant living room and even an exterior courtyard with greenery. Czapsky details the ambiance: "The house is all boarded up and filled with Trunchbull's weird possessions. She's a failed Olympic star who only got the bronze medal, so the house is crammed with shot-puts and javelins and things like that. It's a parody of a Fascistic atmosphere."

To lend the interior a "house of horrors" feel, Czapsky strove to create sharp shadows with a wide variety of small, point-source lights — 2K Molettes, open-eye 10Ks and 20Ks. The crew even created a customized 10K Molette to provide extra exposure for certain shots. The lights were often placed at low angles to exploit the set's banisters, creating a look inspired by classic films such as *The Magnificent Ambersons*. For shots in which Trunchbull sits by her enormous fireplace, scarfing down chocolates while sharpening her javelins, the filmmakers converted Vecchio's Matildavision box to produce a fire effect by adding the appropriate combination of gels.

After Matilda convinces Miss Honey to break into the house and retrieve some of her prize possessions, the two are surprised by the sudden return of Miss Trunchbull, whose clunky car (sold to her by Mr. Wormwood, of course) has broken down in the road. What ensues is a manic chase through the house's nooks and crannies, as our heroines desperately attempt to escape the wrath of the tank-like headmistress. "I shot a lot of the chase on a [standard] dolly, with small moves," says Czapsky. "I did most of the shots with the wide lens — slamming into Trunchbull's face really fast, things like that. The biggest problem with using a crane is that you have to figure out where the camera's going to end up, and rig things accordingly. It's a logistical problem, and it involves a lot of

work with the viewfinder and a tape measure. You try to set it all up according to how the actors want to move."

The film's classroom set, where Matilda eventually launches her supernatural assault on Miss Trunchbull, was given a similarly ominous feel, complete with noirish shafts of light through Venetian blinds. During the film's climactic sequence, the blinds begin to clack open and closed, while the room's lights flicker on and off. To create the effect, all of the practical lights in the classroom were wired to a dimmer control board so they could be clicked on and off or sent into cycles. The special effects crew installed blinds that could be controlled from above, and a variety of lights were aimed into the room from outside the windows. Recalls Vecchio, "We used a Xenon to create a large, sharp shadow on the front blackboard, and the rest of it was done with open-eye 20Ks aimed through the Venetian blinds. The climax is a really wild scene in which everything in the classroom conspires against Trunchbull. She gets pummeled by erasers, and eventually she totters back and forth and keels over like Godzilla, kicking up a big cloud of chalk dust. After that, the blinds magically go up, so we had to do a 'moving blind' effect. We took a 12' by 12' frame and put pulleys on it, then removed a piece of the ceiling so we could lift up the screen and create a 'Venetian blind reveal' on Trunchbull."

Reflecting on the project, Czapsky says that one of his toughest challenges was fulfilling DeVito's wish list while working so extensively with children. "It's always hard to work with kids, because there's a time limit," he says. "The state of California is very careful about how the kids are treated. The time you're allowed depends upon the circumstances of the shoot, but basically you're limited to having the kids for eight hours, and you can only shoot with them for four or five hours. That's not a lot of time when you have a big number of setups to do, as we did on this picture. But the kids really give the film its heart, and I think that shows on the screen." ◆

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Taking the Stand

With *A Time to Kill*, director Joel Schumacher and cinematographer Peter Menzies, Jr. delve into the sensitive issue of race relations in the deep South.

by Naomi Pfefferman

Burning with frustration and anger, Carl Lee Hailey (Samuel L. Jackson) and his family grieve for their brutally raped and beaten daughter. Cameraman Peter Menzies, Jr. hopes that* A Time to Kill *will help open dialogue between the races. "The townspeople [of Canton, Mississippi] told us we brought them closer than they've ever been," he reflects.

On a sunny October morning in 1995, Hollywood brought the Ku Klux Klan to the tiny town of Canton, Mississippi.

They may have only been local townspeople in costume for *A Time to Kill*, the latest adaptation of a John Grisham thriller, but the images were all too chilling, and the memories much too unpleasant in a place where real Klansman marched mere decades ago.

Emotions were fierce as the cameras rolled. Men cloaked in white hoods strutted arrogantly upon the town square, their fists raised in defiance. Chaos ensued as they encountered hundreds of African-American counter-demonstrators. What erupted next was a full-scale riot.

At that point, director Joel Schumacher gave the signal to cut, and the images became even more bizarre. Extras stopped pummeling their mock opponents and helped them to their feet. Blacks and whites conversed, laughed and gave each other amiable slaps on the back. But Canton is a town in which the racial divide is quite literally that: African-Americans live on one side of the railroad tracks and Caucasians on the other. For these townsfolk, *A Time to Kill* provided an opportunity to become acquainted, perhaps for the first time in their lives.

Interracial trust is also the theme of the film, a searing courtroom drama about a black man, Carl Lee Hailey (Samuel L. Jackson), who is on trial for killing the two racists who raped his 10-year-old daughter. Faced with racially motivated hatred and violence, Hailey's idealistic defense attorney, Jake Brigance (Matthew McConaughey), struggles to save his client's life and then his own.

A Time to Kill is based upon Grisham's first novel, his own personal favorite. In fact, he so cherished this book that he reportedly held Hollywood off until he was assured approval of the script, lead actors and director. The author finally selected Schumacher, the director of *The Lost Boys*, *Falling Down*, *Batman Forever* and *The Client*, to helm the third film to be made from a Grisham book. Schumacher in turn entrusted the visuals to Australian-born cinematographer Peter Menzies, Jr. (*Posse*, *Die Hard With a Vengeance*), who caught the director's eye with his work on Roger Donaldson's remake of *The Getaway*.

A Time to Kill is only Menzies' fifth feature as a director of photography, though the 38-year-old Australian has something of a cinematographic pedigree. His father, Peter Menzies, Sr., is a well-known TV commercial director-cameraman. But young Peter did not hanker to follow in the patriarchal footsteps while growing up in Sydney; he believed he would become an architect. That was his goal until the age of 17, when his father got him a summer job as a camera loader. "I fell in love with it," recalls the cinematographer.

The younger Menzies went on to work as a first assistant and camera operator in TV and film before coming to the States in 1985 as an operator on *Crocodile Dundee*. Menzies eventually earned his big break as director of photography in 1991 on *White Sands*, also directed by Donaldson. After three subsequent action films, the cinematographer eagerly accepted *A Time to Kill* as the chance to tackle his first serious drama.

Menzies arrived in Mississippi last summer with two Panavision cameras, a lightweight Steadicam, a variety of Panavision 30mm to 180mm anamorphic lenses, a 5:1 Cooke zoom, 18K HMIs with Chimera light boxes, 4K soft lights from Leonetti, Kino Flo Wall-O-Lites, a Pegasus crane and a Fisher-10

dolly, among other items. He selected Kodak stocks for flexibility in color correction, specifically 5248 for daylight and 5298 for day interiors and night work.

In a surprising twist, the cameraman found *himself* in front of the camera when the CBS-TV newsmagazine show *48 Hours* arrived to shoot an hour-long program on the making of the movie. For the soft-spoken Menzies, a tall, quiet man who always wears black clothing and an Australian akubra hat, the four months on location provided an introduction to an intriguing new world. His previous notions about the South had come mostly from such movies as *Gone With the Wind* and the more recent *Mississippi Burning*.

Yet as he prepared to film *A Time to Kill*, he did not study such classics of Southern antagonism as *To Kill a Mockingbird* or *Birth of a Nation*. Per Schumacher's instruction, he instead perused the photographs of Bernie Imes' "Juke Joint," images of honky-tonks and other watering holes of the sultry, rural South. He also studied the photos of William Eggleston, glimpses of cemeteries and bars that also transformed seemingly mundane fragments of Southern life into art. Also providing inspiration were the paintings of American master Edward Hopper, in which, according to Schumacher, "sunlight almost becomes a character in the piece."

Prior to production, the director of photography also drove around Canton (the spelling of which, coincidentally, is just a letter off from Grisham's fictional town of Clanton), and studied the picture-perfect square, the antebellum courthouse and the storefronts, which were "painted in the most vivid, contrasting colors." He also visited "these amazing bars with painted red walls, lit perhaps by a blue or green light globe."

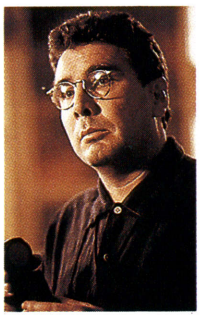
All the while, Menzies coordinated with production designer Larry Fulton and costume designer Ingrid Ferrin to emphasize the vibrant golds, deep saturated reds and, especially, the rich earth tones of the South.

Schumacher wanted to avoid the dark, moody, noir look of *To Kill a Mockingbird*. "That would have been expected," says the director, who instead strove "to show a story of violence and redemption amid extreme physical beauty and lovely, warm sunlight." He hoped to present the paradox of a pastoral place where terrible things may occur during a sweltering Southern summer.

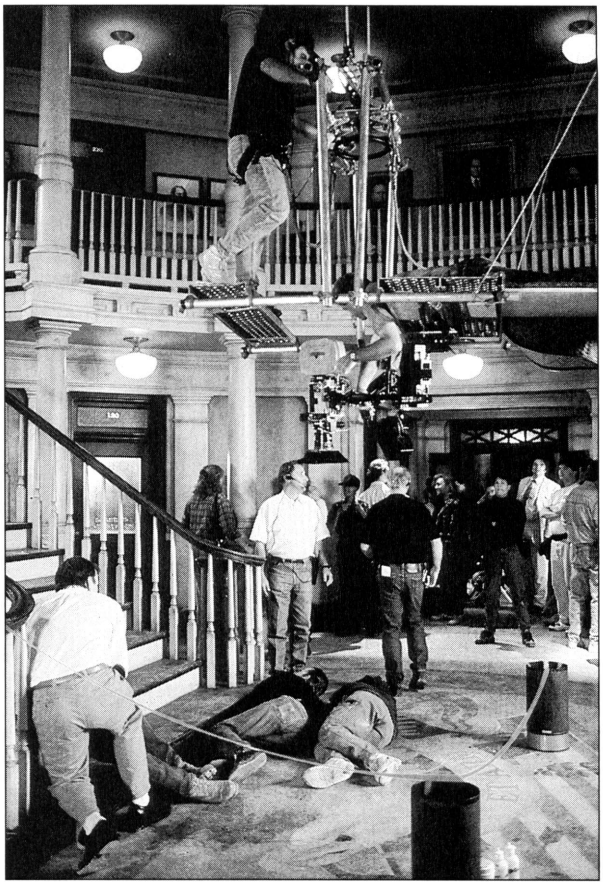
To capture that heat, Menzies "color-saturated [toward warm colors], the yellows and the ambers," with an array of Kodak 81- and 85-series gelatin filters and Tiffen glass filters. The lights were "always warmer than normal," often with one or two layers of full CTS color correction straw gels from Lee and Rosco. The lighting design evoked a milieu in which both tempers and temperatures flared. "We'd always try to have something extremely bright in the frame," Menzies recalls. "We'd send colors down to 1500° Kelvin, and behind that we'd burn an area that was maybe four to six stops overexposed, so people would walk through these pools of amazingly hot light.

"Of course, with the new Kodak films, the latitude is so extended that we now have to push ourselves to get that sense of contrast," he adds with a smile. "We have to put so much more light and color in, because the films are almost becoming too forgiving."

The cinematographer's work exudes a shimmering heat, but Menzies found himself battling the hot, humid temperatures of the Southern summer while standing behind the camera. But as the shoot progressed from early September to mid-December, the director of photography's challenge was to "match" his earlier work while racing through some 50 locations with dozens of actors and hun-



Upper left: ***Jackson, author John Grisham and director Joel Schumacher confer. Menzies (upper right) shot the courtroom scenes on stage (bottom). The lighting consisted of four 20' x 20' lightboxes on dimmers holding six 9-lights apiece. Says Menzies, "They came down from the roof and could be gimbaled in any direction on winch motors." Two layers of silk kept the light soft and flattering. Outside 10 "windows," a 20K lamp on a truss could be raised or lowered to change with the fictional time of day.***



Right: ***The racist attackers lie dead on the state seal. The sequence includes a vertical dolly shot, in which Steadicam operator Robert Presley was hoisted 45 feet in the air on a 6' x 6' platform (far right). The rig, which worked via a series of wires, pullies and weights, was designed by expert technician Earl Wiggins*** **(Batman Forever).** ***It provided a better rise than a crane, which would have produced an arc rather than a true vertical dolly. The image revealed is decidedly less gory that the one in Grisham's novel. "I didn't think viewers could take some of the violence that is written in the book, and I didn't think it was necessary," Schumacher explains. "Everything is so graphic in films these days that it leaves nothing to the imagination, but your imagination is often more terrifying than the reality on the screen."***

dreds of extras.

His rather unconventional ally, in this regard, was the Steadicam; he used it not just for chase-up-the-stairs sequences but to film half the movie as well. According to the cinematographer, the Steadicam (in the capable hands of operator Robert Presley), "allowed us to cover dialogue very quickly, so if we did get a window of great light we could go in and shoot in a minuscule amount of time. We could whip through something that would take five or six shots to cover in a conventional setup, so the actors could do just one great performance instead of constantly having to be off camera and feeding others their lines.

"The Steadicam also lets the audience feel what the actor is feeling, because the camera can bounce off the performer and then become his point of view in the one-shot. It makes viewers feel as if they're 'in there' and part of the story, not as if they're watching a fast-cutting, MTV-type of film. It's as if the camera almost becomes a third person, an observer of the many emotions in the movie."

Of course, the Steadicam has its difficulties, as Menzies is quick to point out. The first is pulling focus. "The actor and the camera are both moving, and the poor first AC never has a reference," the cinematographer explains. "He's always remote from the camera, so he has to just feel what's going to move." Fortunately, Menzies' first assistant, Richard Mosier, was so adept that the director of photography could use even the longest of lenses without hesitation.

Nevertheless, using the Steadicam was still "a nightmare lighting-wise," because the crew often had to light a space to work in 360 degrees. "We became very good at hiding thing," he says. "We would often use practical lamps to light a scene, and we wouldn't try to change what was happening in the room."

For example, in the dramatic sequence in which Hailey confesses to Brigance that he has committed murder, the cinematographer created a simple sunset scenario in the attorney's stately law office. Outside each of four windows, he placed an 18K HMI with double layers of full CTS, which shone through almost-closed reddish cedar blinds. The rest of the room was lit simply and practically, with 150-watt household bulbs in three table lamps.

Meanwhile, the cinematographer utilized Panavision's C-series anamorphic lenses, which, while not as sharp as the newer Primos, were smaller and lighter and therefore better for the Steadicam. "They also hold their flare incredibly well, so they allowed us to put bright lights in the shot for contrast," Menzies says. He notes that had the opposite problem on *Die Hard With a Vengeance*. "[Director] John McTiernan and I would always joke, 'Is it gonna flare? Is it gonna flare?' Because we loved the flares, and then it *wouldn't*."

When asked to determine which sequence in *A Time to Kill* was the most difficult, Menzies is quick to answer. "It was, without question, the rape scene, which is so graphic in Grisham's book that many readers put it down at that point and never continue," the cinematographer says. "We were very

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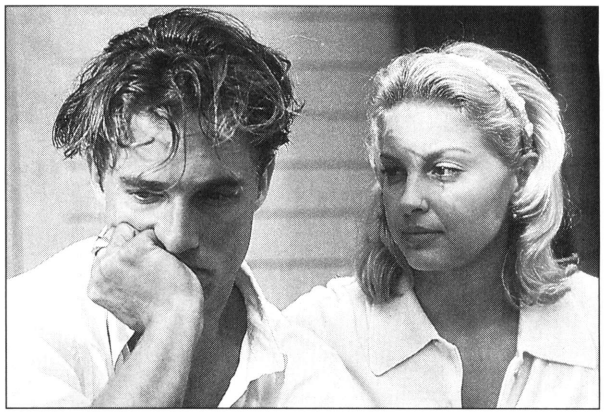


Embattled defense attorney Jake Brigance (Matthew McConaughey) is consoled by his wife (Ashley Judd). Menzies kept his lights "warmer than normal" to emphasize the sultry Southern weather.

nervous, and we wondered how much we should show. We also wondered how we could ask two young actors who had become our friends to act out such a horrific thing. The hours we spent preparing for that sequence were very emotional, because many of us didn't want to do it."

In the end, the crew dug a hole in the ground on the edge of a cornfield outside of town. In it they placed a remote camera with a 24mm wide-angle anamorphic lens that "had quite a bit of distortion in the look," Menzies recalls. "We placed it as close as possible to the young girl's point of view, and waited until the sun was in the shot, broken by leaves, to get an occasional flare." There were also some extreme, handheld close-ups of ropes bound about the girl's small, bloody hands and feet.

Says Schumacher of this surreal scene: "It was important to give the audience the sense of violence without being literal."

Nevertheless, the sequence was so upsetting that only the most crucial crew members remained on location, while the others were sent back to base camp. The 10 remaining individuals retreated behind a black curtain that the grips had constructed some 30 feet from the camera "so the actors could hit the camera, spit on the camera and do anything they wanted without feeling self-conscious — without feeling that we were there," says Menzies.

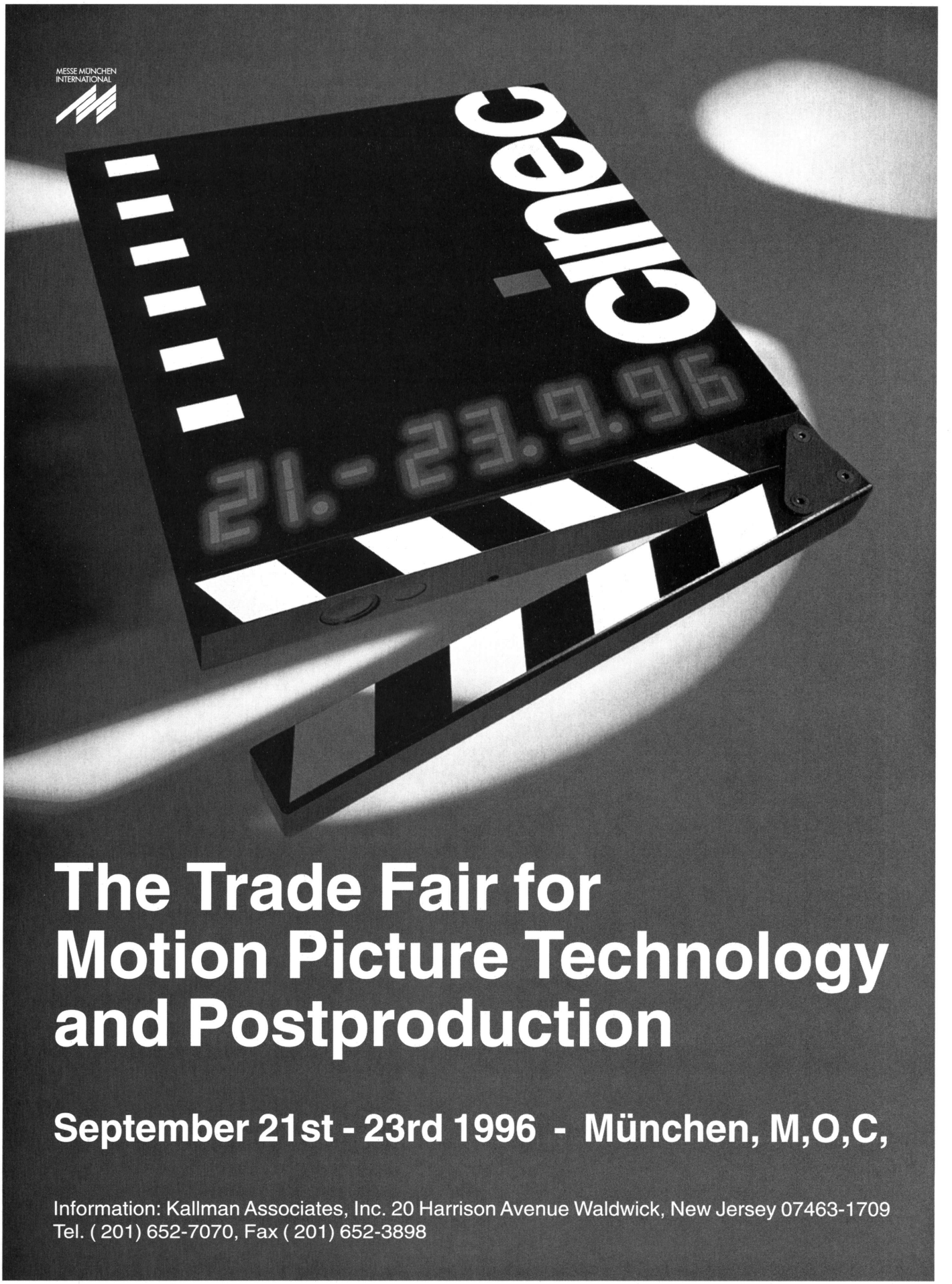
As the crew worked quietly, the cinematographer thought of his 2 1/2-year-old daughter, Emma. He and Schumacher watched only one take of the dailies, "because it was the kind of thing you could only watch once."

The scene in which Hailey subsequently kills his daughter's rapists is more faithful to the step-by-step action outlined in Grisham's book — minus the splattered blood and brains on the stairs of the courthouse rotunda. Instead, the stylized, meticulously choreographed sequence achieves an operatic, larger-than-life quality via the subtle use of high-speed photography, dutch angles, fluid Steadicam, handheld cameras and some overhead work.

Menzies set up shop on a set in a warehouse outside Canton, emblazoned with a giant, earth-toned floor mosaic bearing the Mississippi state seal. For the first shot, he utilized the 5:1 Cooke zoom, with the lens wide open, to close in on Hailey's tension-filled face. The distraught father is seen hiding in a janitor's closet, lit only by a 250-watt household globe, "with an incredibly warm orange on his face."

When actor Samuel Jackson burst out of the closet with an M-16 rifle, Menzies had four Panavision cameras cranking from 20 to 120 frames per second, each take at a different speed with a different lens "to give Joel a lot of coverage very quickly. We even played around with some subtle, unusual speeds, like 27 fps, so viewers' eyes would be blinking just a bit differently."

Overhead, two 20K tungsten lights on Condors were controlled with a dimmer system, "so we could change the color of the lamps through the voltage," Menzies says. "We shot the lights off the color meter, below 1400° Kelvin, and we didn't use any gels or lens filters. We wanted to keep things extremely simple, so viewers would feel as if the execution were happening right in front of them, like a shocking little play."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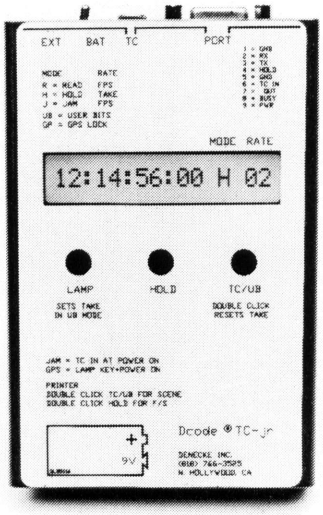

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In the sequence in which the Klan clashes with the hordes of black counter-demonstrators, the director wanted the scene to play like 1960s riot footage, with the camera amid the fight.

For this reason, Menzies knew he would not be able to use the Steadicam, which can swing out of control with a single tap. Instead, he went with four handheld cameras dispersed in the crowd of 350 extras. He utilized warm 81-series lens filters to maintain the early-morning look as the hours progressed.

"We wanted to give the audience the sense that they were in and among the rioters, and the only way to do that was to have the cameras thumped around and out of focus," Menzies says. "Occasionally, Joel and I would run in and bump the cameras ourselves, to make things a bit more violent."

Schumacher kept real-life emotions in check by "running a very happy set, by telling stories and jokes to diffuse the tension," according to Menzies. "Of course, it was still logistically difficult to deal with all of those extras. Imagine just trying to communicate 'cut' to 350 people who are all beating each other up." When the loudspeakers were ignored, Menzies and his crew ran into the crowd to stop the action.

Between takes, however, most everyone was boggled by the incongruous images that materialized off-camera. "You'd be eating lunch and there would be one of these KKK guys with his hood off, laughing and talking with a black neighbor," the cinematographer recalls. "It was surreal."

When the cameras were rolling, however, the emotion Menzies most felt for the hooded Klan costume was "complete and total disgust." He often shot the racists with the lens below eye level, to make them seem more menacing and imposing. He also used firelight in several sequences to enhance their sinister aura. For instance, Menzies notes, when the bigots toss a burning cross from their pickup truck, "we used the fire as our light source, so there was a flickering, dancing light on the actors' faces. When they threw the cross, they went dark."

Firelight was also integral to the eerie, candlelit ritual in which the brother of one of the rapists, portrayed by Kiefer Sutherland, is inducted into the Ku Klux Klan.

Gas flame bars flickered just out of frame as the Steadicam tracked slowly and horizontally across Sutherland and the other initiates. Behind them, a dozen bright torches prevented the firelight from becoming too pretty, "building up the contrast in the image to keep it menacing." An 85C filter on the 40mm lens enhanced the "very warm fire color," as did two or three small tungsten 2K lamps, outfitted with a layer of full CTS, against the far wall.

Outside each of the room's two windows, meanwhile, an HMI with layers of CTB and plus-green lit the smoke from the torches with a blue-green cast. "The contrast made the warm colors seem even warmer," notes the cinematographer.

Perhaps most difficult fire sequence was a night scene in which KKK burns down Brigance's home. First, a house was relocated in two pieces to an empty lot, where it was "glued" back together, soaked with flame retardant and filled with propane gas that could be controlled by the pyrotechnics crew. Menzies ran four cameras simultaneously to get as much coverage as possible, because he knew he'd only get about two takes before the house burned down for real.

Three local fire trucks and six police cars were on hand, and Menzies used their strobe lights to illuminate the actors in the foreground, plus three banks of blue and red flashing lights just out of shot. The pulsing effect "gave a real sense of urgency to the scene," he says, noting that additional light was provided by 18K HMIs on two 100-foot Condor cranes.

The challenge, however, was "balancing the foreground and the background so that the flames would be intense and somewhat overexposed without going totally white," Menzies says. "The question was, 'How bright do we make the fire? And how underexposed do we make the foreground?"

Ultimately, he used an

85C warming lens filter, "which helped hold some of the warmth of the fire, so I could overexpose the flames a bit more. We only lost one-third of a stop."

The logistics were very different for the film's lengthy trial scenes, which were filmed on a set with huge, elaborate WPA-style murals. After all, how does a cinematographer make a courtroom interesting, given the plethora of such scenarios in film and TV?

One powerful tool was the brand new Panavision 3:1 (270mm-840mm) anamorphic zoom lens, which at the time was a prototype. "The lens gave us close-ups with enormous separation, so we could really focus on our performers," the cinematographer says. "To make the tension build, we zeroed in and in and in on the principals, isolating them from the rest of the people in the courtroom."

The zoom also allowed Menzies to shoot the extras, who were not professional actors, from such a distance that they did not know they were being filmed. "With another lens, we would have had to have the camera two if not three times as close," says the director of photography, who found the device to be a terrific time-saver.

For Brigance's emotional closing argument, the filmmakers opted for a simple dolly shot with the Cooke zoom gently tracking the attorney as he moves horizontally across the jury box. "Everything was very slow, with nothing to distract you from looking into Jake's eyes and hearing his voice," says Menzies.

The speech itself also had a dramatic effect. "It was the first time I'd ever seen a bunch of tough, hardened film technicians sobbing, especially those of us who are fathers," Menzies recalls.

Recently, as the cameraman was preparing to head back home to Sydney, he could not help but draw comparisons between the situation of African-Americans and that of aboriginals in his native Australia. He notes, "The aboriginals, too, are fighting for their rights, and while things have greatly improved in my generation, there is still a long way to go." ◆

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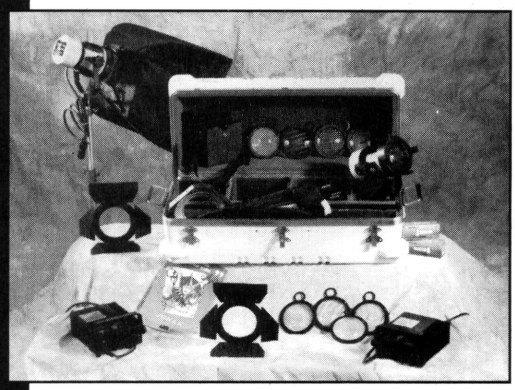

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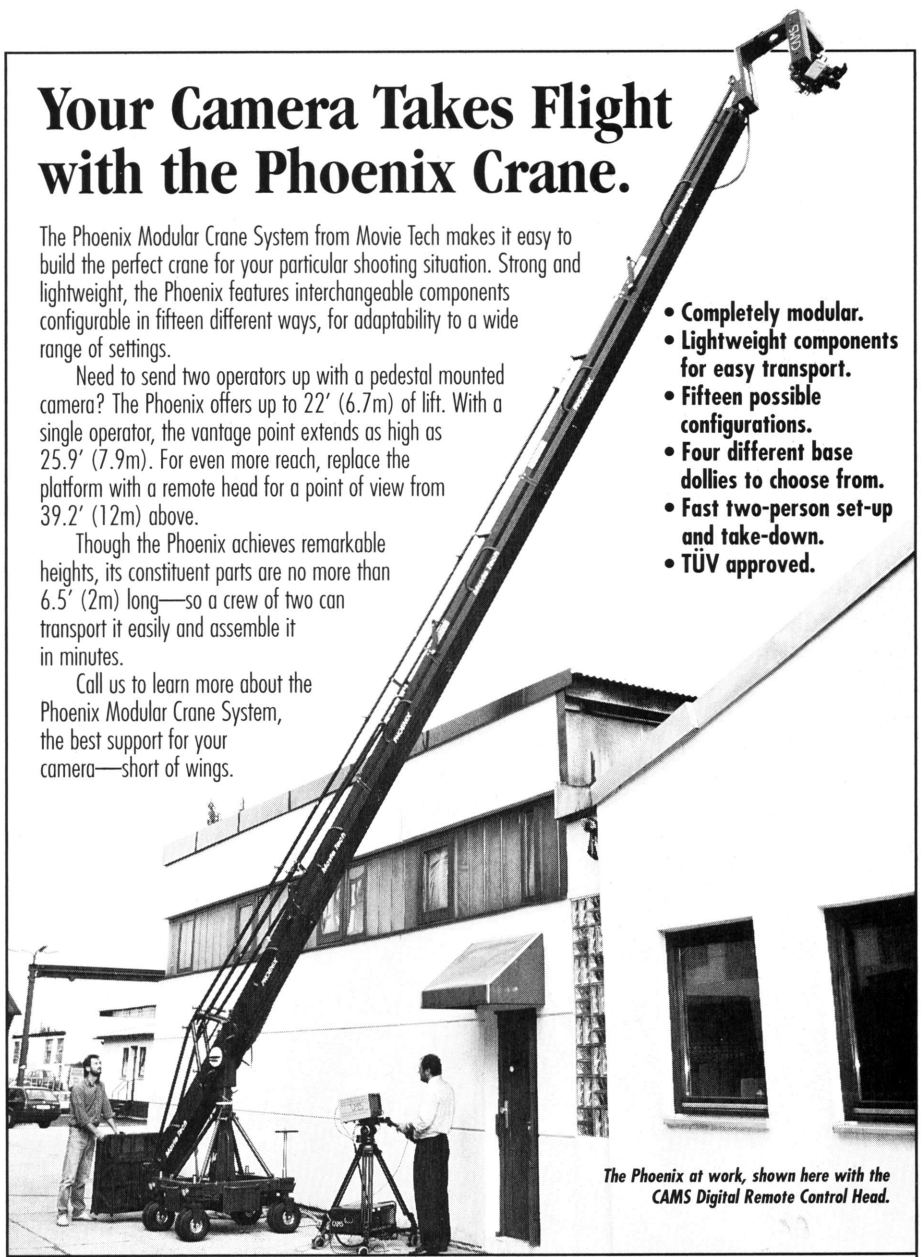

The Phoenix at work, shown here with the CAMS Digital Remote Control Head.

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Trains, Veins and Heroin Deals

Director Danny Boyle and cinematographer Brian Tufano, BSC tackle the thrills and throes of heroin addiction in *Trainspotting*.

by Andrew O. Thompson

Below: *Jock-turned-junkie Tommy (Kevin McKidd) and his skittish companion Spud (Ewen Bremner) pontificate against a vivid backdrop. Reflects Boyle of his film's broad spectrum, "British films tend to shy away from a decent use of color. We tried to use colors sensually — watching* Trainspotting *should be a visceral experience that keeps you entranced for 90 minutes."* Right: *Boyle confers with Tufano, prior to a shot in the dilapidated drug den. Save for the set's surreal palette, its look mimicked that of the low-income housing estates observed by the director in Leith, the working-class suburb of Edinburgh where the* Trainspotting *novel takes place.*

RARELY HAS THE CINEMATIC PORtrayal of heroin addiction been an uplifting one, a fact exemplified by such harrowing films as Uli Edel's *Christiane F.*, Shirley Clarke's *The Connection* and Lili Fini Zanuck's *Rush*. In contrast, British filmmaker Danny Boyle's *Trainspotting* travels the same vein as Gus Van Zant's *Drugstore Cowboy*, in that it additionally depicts some of the pleasures of being a drug fiend.

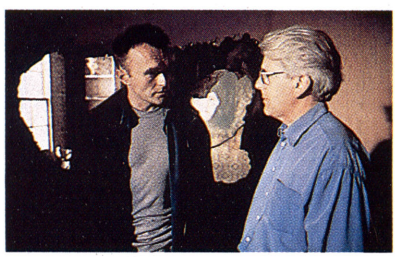
In adapting Scotsman Irvine Welsh's episodic novel, Boyle also sought an authentic depiction of addiction, going so far as to confer with present and past abusers as part of his research. But since the book's take on this sordid subject matter is a celebratory one, Boyle thought that a grim, documentary-style approach would be inappropriate. The stance also suited the director's desire to depart from the established aesthetics of English filmmaking.

Says Boyle, "British cinematic culture has a very strong tradition of dogged realism, and that's something we fought against. We didn't want this to be the kind of drug film that has a lot of bleak shots of housing estates as its context. The book is about the spirit within the characters, which is what we tried to capture. It's meant to be from [the addict's] point of view, rather than that of outsiders who don't do heroin.

"So we've got this incredibly seductive, energetic opening and all of this talk about heroin being better than the best orgasm you've ever had multiplied by a thousand. Then *Trainspotting* becomes like any other drug film, in that you see some of the costs involved. But you've got to use different techniques to get an audience to that point, or people won't go near a heroin film."

Set in the underbelly of Edinburgh, Scotland, *Trainspotting* chronicles the misadventures of junkie Mark Renton (Ewan McGregor) and his motley band of mates: the alcoholic ruffian Begbie (Robert Carlyle), dapper Sean Connery aficionado Sick Boy (Jonny Lee Miller), and manic speed-freak Spud (Ewen Bremner).

Released last February in the U.K., the controversial film (budgeted at a mere $2.3 million) met with rave reviews and became one of the nation's top-grossing indigenous productions.



Instrumental to this success was the return of key production people from Boyle's directorial debut, the macabre thriller *Shallow Grave*. They included editor Masahiro Hirakubo, production designer Kave Quinn and director of photography Brian Tufano, BSC.

Tufano's interest in cinematography began early; he learned to operate a camera at the age of 12 as a member of an amateur film club in his native London. At the same time, he spent weekends frequenting the BBC studios, where gate guards allowed him peeks at the station's array of camera equipment. Four years later, after graduating from middle school, he worked as a gofer for the network's television division.

Ever eager, Tufano pestered his superiors for a technical position and became a trainee projectionist for the BBC's film division. Soon after, he began moonlighting as an assistant to their two-man on-location camera crews. Though invaluable training, the experience instilled a disdain for soccer in Tufano, as he spent many a blustery winter weekend covering this sport. At 23, he was promoted to full-fledged director of photography, making him the youngest cinematographer employed by the network at that time.

Following a period of documentary work, Tufano switched to BBC features, working with such directors as Stephen Frears, Karel Reisz, Ken Loach, Alan Parker, Les Blair and Jack Gold. The cameraman has earned three Emmy nominations (*Search for the Nile*, *The Evacuees* and *Murder Is Easy*), two BAFTA nominations (*The Evacuees*, *Middlemarch*) and a Royal Television Society Award for Photography (for Clive Rees' *Travel By Dark*).

His theatrical feature credits include *The Sailor's Return*, *Dreamscape*, and three films directed by Franc Roddam: the cult-classic *Quadrophenia*, *The Lords of Discipline* and *War Party*.

Tufano first collaborated with Danny Boyle in 1992 on the BBC mini-series *Mr. Wroe's Virgins*, an 1830s period piece about a lascivious priest. A policy Boyle adopted on that production, and has practiced ever since, is to have all of his sets built at a single location. This tactic provides a controlled environment — a necessity given the U.K.'s unfavorable weather conditions — and allows the director to fashion his sets in proportions greater than that of the actual rooms they represent. *Trainspotting*'s 14 sets were housed in an abandoned cigarette factory in Glasgow. Elaborating upon his location strategy, Boyle says, "We can create our own universe, rather than use the slightly pallid one you'd find over here, so we can work any way we like in terms of color, light, space and movement."

director's observations of actual heroin users. Says the cameraman, "Addicts spend a lot of their time flat on their backs on the ground. In namic opening, the first scene is of Renton falling flat on his back. From then on you're almost always on the ground."

Photos by Liam Longman, courtesy of Miramax Films

The realities of shooting on location in low-income public housing developments, where much of the film is set, were too limiting. Offers Boyle, "We wanted a big space for [the drug den]. But housing estate rooms are very small, so we [built our set to look as if the addicts had] knocked through several walls to create a much larger one. It seemed like an imaginative idea, but weeks later, while visiting a real housing unit, we found that squatters and junkies had actually done [the same thing], joining different rooms into a kind of communal area."

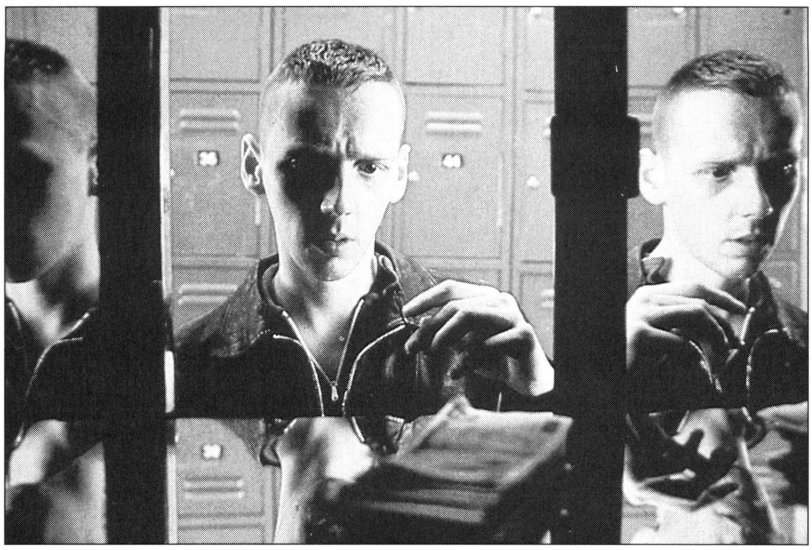
Tufano's habitually low-angled camera placement was another strategy that arose from the

a lot of the scenes, we couldn't have gotten much lower unless we'd dug a hole and gone just below ground level. That sums up a drug addict. Apart from the dy-

To give his collaborators a visual frame of reference, Boyle always assembles a huge scrapbook jam-packed with pictures by artists and photographers. *Trainspotting*'s inspirational images were culled from trendy youth-oriented music and fashion magazines, as well as *National Geographic*, photos by Cartier-Bresson and the paintings of Francis Bacon. The director also organized screenings of such visually disparate films as *Near Dark*, *The Hustler*, *GoodFellas*, *The Exorcist*, and *A Clockwork Orange*.

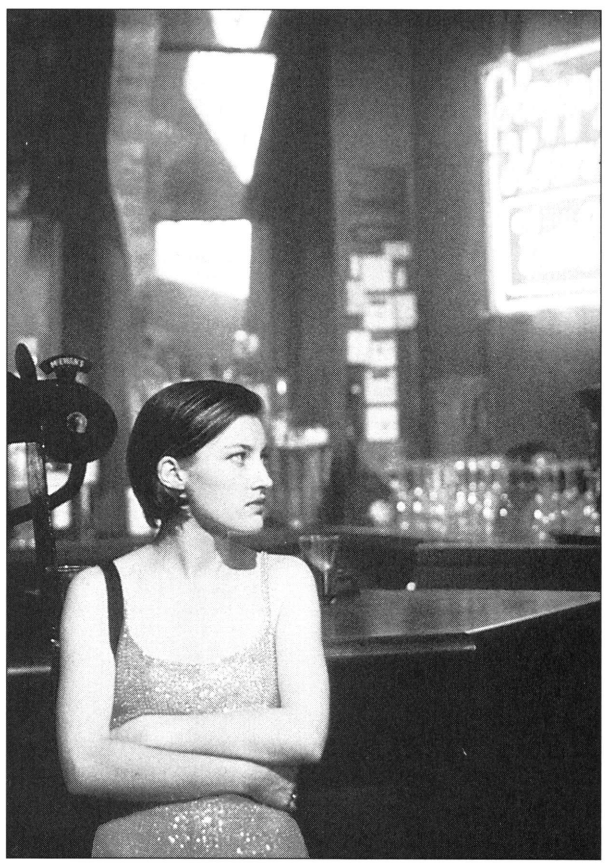
Trainspotting's color scheme holds no symbolic significance. However, its surreal palette (described by the director as "more Mediterranean, exotic — not psychedelic, but deliberately seductive") was meant to subliminally counteract the general feelings of repulsion that audiences experience while watching scenes depicting heroin use. Production designer Quinn saturated the sets in the vibrant shades favored by such directors as Pedro Almodovar and Peter Greenaway.

Left: ***Addled addict Mark Renton (Ewan McGregor) sprints wildly down Edinburgh's bustling Princes Street during*** **Trainspotting's** ***in-your-face opening sequence.*** **Center:** ***A literally strung-out Renton lies bound to train tracks. The term "trainspotting" refers to a popular pastime of the Steam Age that entailed waiting at train stations to take stock of the incoming locomotives. Nowadays, to tag one a "trainspotter" is to make a slightly humorous jab at an individual's obsessive and futile habit, such as heroin addiction.*** **Below:** ***Relaxing in a park with his buddy Sick Boy (Jonny Lee Miller), Renton sets his sights on the unsuspecting.***



Right: ***Spud finds a care package of cash from Renton, who has absconded with the proceeds from their gang's rather lucrative drug deal.*** **Below:** ***Armed with the Aaton-III, Tufano situates himself on a MagLiner cart while preparing for a low-angle, handheld tracking shot of Diane (Kelly MacDonald).***

Pushing the "dolly" from behind is grip Adrian McCarthy, while loader Lewis Buchan (with tape on belt) observes in the background. **Far right:** ***The self-assured Diane strikes a pensive pose against a moody, neon-littered backdrop.***



The drug den was divided by illuminating each portion in a specific color. Tufano often gelled the windows of the set itself; the kitchen was bathed in red, while Renton's room was yellow. An inner room where a dead baby is discovered featured blue-gelled practicals. The squat, cylindrical floor lamps were found by Quinn and art director Tracey Gallacher and controlled with dimmers. These were supplemented by similarly gelled, off-screen fixtures. In certain areas of the den, fill was supplied by Chinese lanterns mounted above, under or to the side of the camera, as well as light bounced off beadboards.

Tufano, who has a preference for soft lighting, likes to motivate his illumination from windows, doorways or practicals in shots utilizing a direct source. In the den, his key fixtures were usually 10Ks, often shined through boarded-up windows. The random nature of the set's lighting was meant to mimic that of an actual junkie flat (albeit in heightened colors), in which fixtures are installed wherever feasible. Relying primarily on Arriflex gear, Tufano's tungsten package on *Trainspotting* consisted of 10Ks, 5Ks, 2Ks, and 1Ks, and 650- and 300-watt lamps. On exterior locations, he used HMIs — multiple 4K Pars for day work and a 12K with a clear glass lens that lent clean, hard shadows to nighttime scenes.

The director has often stated that the look of his films could be described as "noir lighting in color." According to Tufano, a night scene in which Renton's mates coerce him into contributing £2,000 worth of his savings to their climactic drug deal evokes such a mood. It also offered Tufano the opportunity to pay homage to one of his cinematographic heroes, Russell Metty, ASC.

Says Tufano, "I wanted that sequence to jog the memory of anyone who had seen Metty's work in Orson Welles' *Touch of Evil*. [As practicals], we had some old Atlas fittings used to floodlight buildings, the sort of lights these people would have acquired from junkyards and kept in their apartments. I had them lying on the floor. So the whole set was lit completely from below with [the characters'] shadows on the wall. We created strong shadows, but they weren't hard [in terms of contrast]. There was quite a lot of soft light around, but there was one distinct shadow which was deliberately placed in the composition from shot to shot.

"Although those sources were actually in the frame, they weren't the lights that were illuminating it; I used 2K Skypans for that. They got very hot when people walked past them and then went off into the shadows. We used them to great effect to get that kind of 'drug deal' look, to add a bit of mood."

Given *Trainspotting*'s varied locations — the multi-colored drug den; the perpetually overcast exteriors of London, Edinburgh and Glasgow; darkened nightclubs

intermittently lit by strobes and blacklights — Tufano required a film stock with an extremely wide contrast latitude. He chose Kodak's 5293, which he uses on all of his projects. The cinematographer found the 200 ASA tungsten-balanced emulsion particularly advantageous in a night scene set outside the blood-red exterior of The Volcano, a Glasgwegian club where Renton is picked up by Diane (Kelly MacDonald), a rather sophisticated schoolgirl.

Says Tufano, "In the wide shot, the camera is very low, tracking back as they are walking away from The Volcano in the middle distance. In the far distance there are houses about a quarter of a mile away on a hill, which I lit with three spotted 4K HMI Pars on cherrypickers. It's just enough to register, which gives an amazing feeling of depth to the scene. A 12K HMI on a Condor was my key, providing moonlight. Instead of giving a blue effect, the uncorrected HMIs lent a cold one which, to my eye, is more convincing. I'm sure you could do it on another stock, but I just happen to use 93 so much that I know its peculiarities."

Given Tufano's preference for equipment that's "as small and unobtrusive as possible," the former documentarian selected the Aaton-III 35mm camera, as well as the full range of Zeiss lenses. Focus puller Robert Shipsey had the Aaton fitted with an Arriflex 535 matte box and a remote follow-focus and aperture control system. Additionally, an Arriflex BL4, Tufano's sole camera on *Shallow Grave*, was utilized for longer dialogue scenes. A boon in budgetary terms, the Aaton permitted Tufano, who operates his own camera, to work quickly. This was imperative, as *Trainspotting* had a scant seven-week shooting schedule that required numerous handheld shots.

A favorite lens of the director's was the 10mm. Its use, however, posed problems in that Boyle wanted to shoot many scenes handheld. In the Volcano, for example, Tufano had to time his movements to coincide with the nightclub's strobe lights so that his shadow didn't appear on actor McGregor's face.

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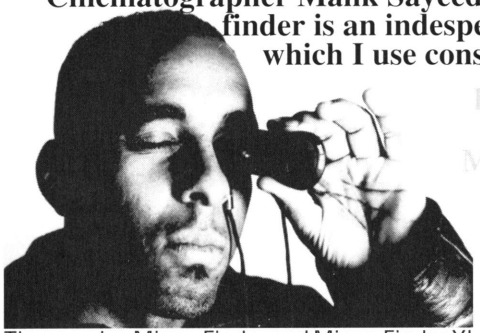

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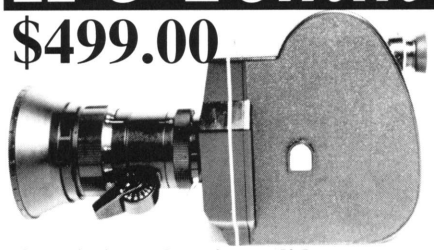

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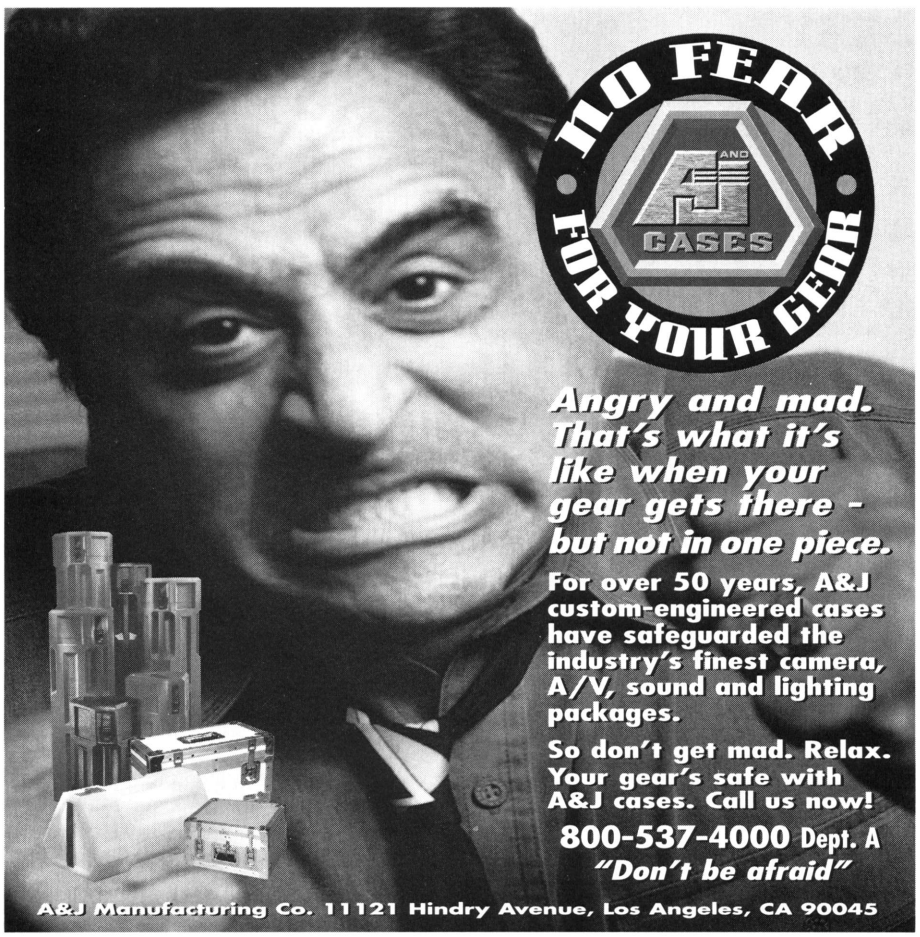


The lens was also used to create a tunnel effect for a scene in which Renton, living with his parents and trying to kick his habit cold turkey, suffers from hallucinations. The bed in which he is sleeping begins to move across the room as images of his friends haunt him from all directions, even from beneath the bed sheets. As the horrific episode continues, the dead baby discovered earlier in the drug den (a figure designed by prosthetics artist Grant Mason) crawls towards him on the ceiling above. The camera tracks with the bed throughout the scene.

Describing the bed move, Tufano explains, "I had the grip, Adrian McCarthy, lay a pipe track and then we built a very long dolly using some wheels from Willy's Widgets and a Chapman Pee-Wee. We mounted the bed on the Widgets portion of the dolly and then tracked the whole scene back with the camera mounted on the Pee-Wee. It was bit like a train."

Tufano credits McCarthy, focus-puller Shipsey and gaffer Willie Cadden for the smooth coordination of the *Trainspotting* shoot. Another makeshift camera move they devised to fit within parameters of their budget was the use of a MagLiner cart as a dolly. The cinematographer positioned himself on it in either its upright or prone position to obtain low tracking shots. They later sought to incorporate this technique with the feeling of a Steadicam move, but had no time to experiment with hard-mounting the Steadicam on the MagLiner. So for some moves in the drug den, the Steadicam operator, Simon Bray, found himself in the unenviable position of being situated in a wheelchair and having to bend over while wearing the bulky apparatus.

The filmmakers' most audacious use of camera movement occurs during the film's opening sequence, as Renton barrels down Princes Street on foot, only to slam into the hood of an oncoming car. Boyle wanted viewers to experience the scene as if it were happing to them. Says the director, "We wanted to start the film with this huge adrenaline rush."

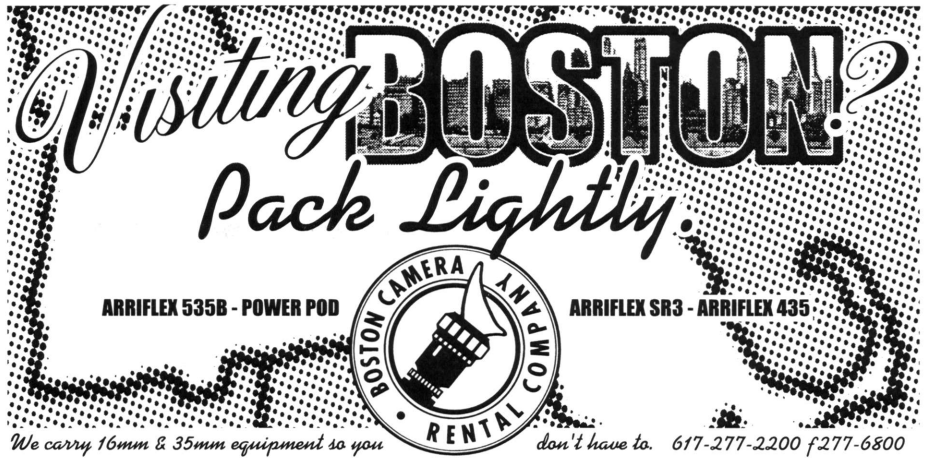
Tufano turned to Bickers Action, a British company that spe-

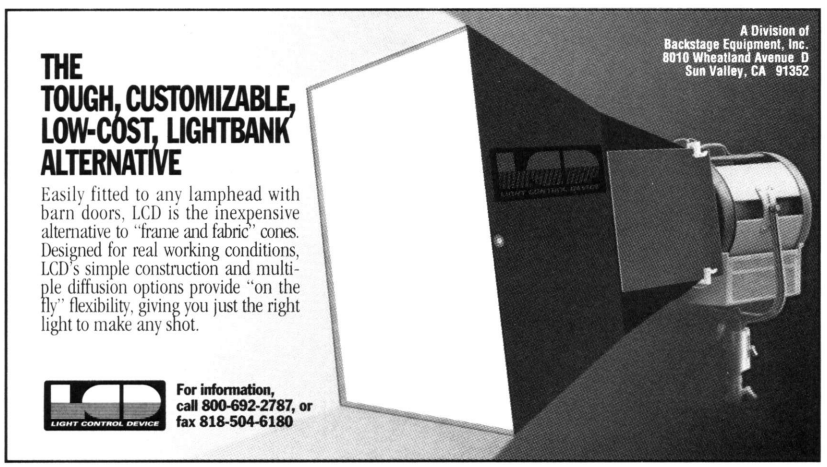
cializes in tracking vehicles, for help in devising the rig. Its design incorporated a motorcycle sidecar attachment for use by the cameraman. The cinematographer details, "It was basically a motorbike with a wooden platform on the side that I could lie on. The platform has a small wheel on it with its own air-controlled suspension. It's quite low, so I was able to lie on the platform and hang over the front edge with the Aaton. My knuckles were literally scraping on the pavement as we went down Princes Street."

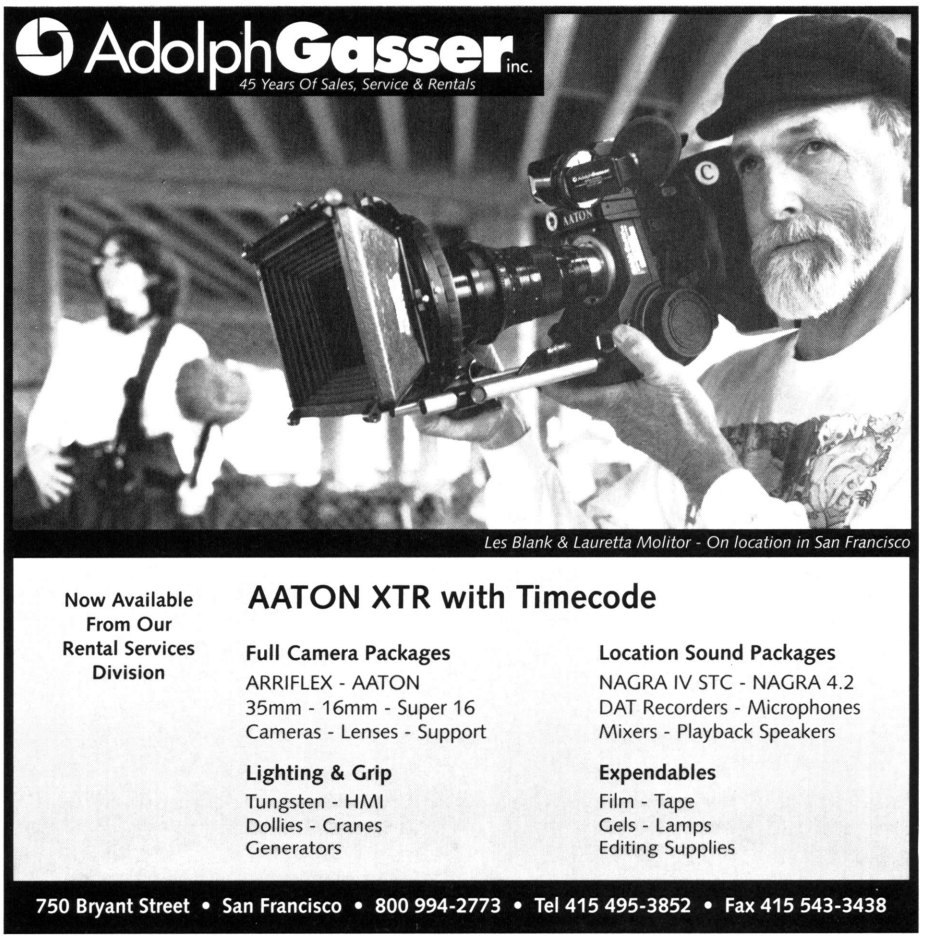
Boyle, a former theater director, favors framing in wide shots that give audiences a true sense of a location's scope. His approach is a reaction to the preponderance of close-ups that he says the BBC dictated as an integral aspect of their televisual language. He had initially wanted to shoot *Trainspotting* in anamorphic, but that possibility was nixed by the film's financiers, the British television network Channel Four, since 2.35:1 wasn't a feasible broadcast format. Tufano, however, supervised the timing process for the video transmission copy and had the freedom to alter the framing wherever he felt it necessary. The director, who's been dubbed the "British Tarantino" by journalists in his homeland, points to *Pulp Fiction* to explain his own mode of framing.

"If you watch the way that film is shot, Tarantino basically lets you select what you want from the picture," Boyle says. "He sets up the frame, lets the actors act within it and you can watch what you want. There's no absolute focus where he's saying, 'Watch this and nothing else.' That involvement with the audience is fantastic. It's saying, 'Just come in here and get completely lost.'"

In *Trainspotting*, the injection that leads to Renton's overdose is actually a "critical homage" to the use of smack in Tarantino's film. Says Boyle, "In *Pulp Fiction*, the heroin is white. People here haven't seen any 'China White,' as it's known, since 1970. They all use the really crappy brown stuff from Pakistan. So it was important to be inside the chamber of the needle to show what's left in there and what's going into their







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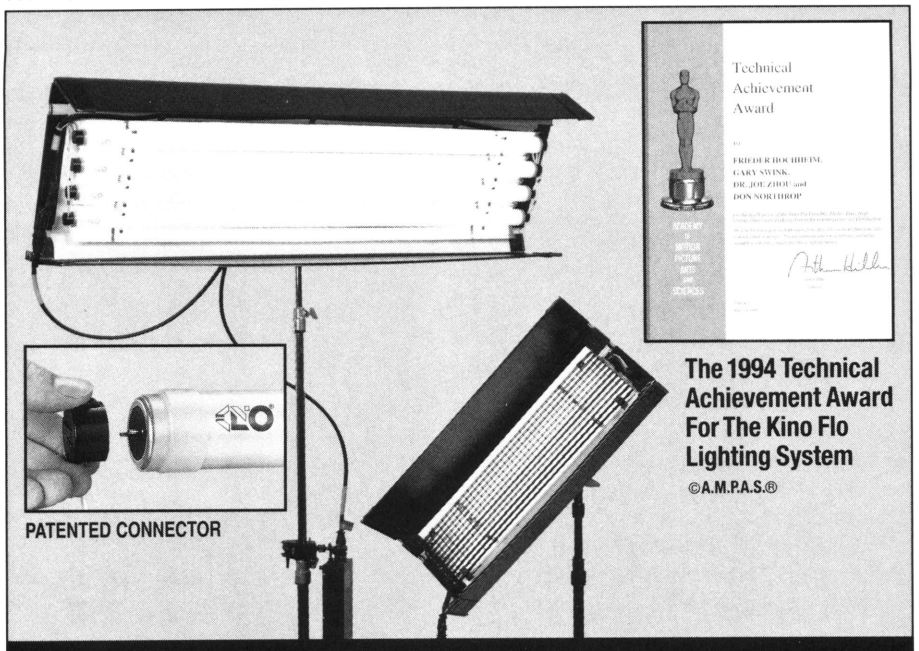

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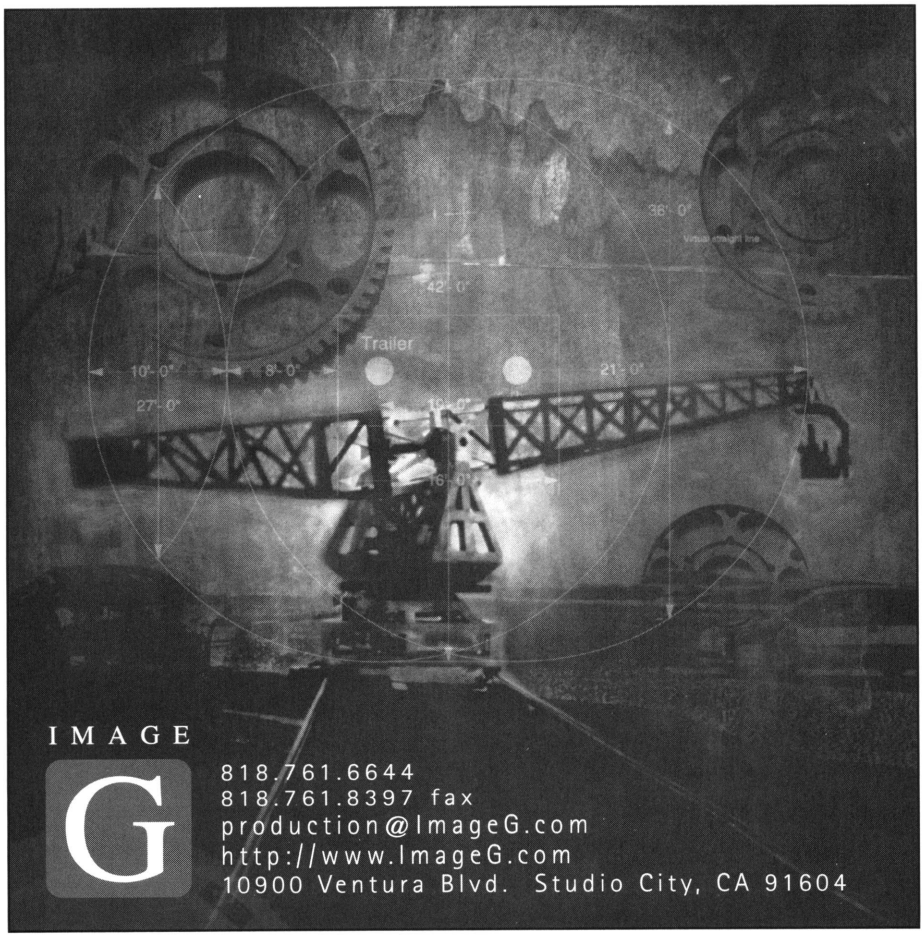

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veins, because that's what causes problems. Abscesses form due to the impurities running around in [the addict's] bloodstream."

This sequence, in which the not-so-refined heroin is simulated by crushed cigarette ash, proved to be the greatest technical challenge the cinematographer faced on the shoot.

Recalls Tufano, "We used a lens called a 'borescope,' which is a long optical tube on the end of which you put a lens. It's not particularly small, maybe an inch or two in diameter. Our visual effects people made up a giant syringe about four inches in diameter going down into a needle that was much larger than normal. The camera was mounted vertically with the borescope just inside the tube. We spent a few hours working out the amount of liquid needed, and then lowered the lens on the arm of the dolly as the fluid was drawn out with a siphon. We tracked down inside the syringe with what was supposed to be the heroin as it was going out and into the vein."

Boyle and Tufano are currently preparing *A Life Less Ordinary*, a darkly comedic romantic thriller set to begin production in September. It's to be shot entirely in the United States, and in the Super 35 format. Now that the cinematographer has another British cult film under his belt, it's just a matter of time before he learns if *Trainspotting* will have the same impact on American youth as a film like *Quadrophenia* did. Upon relocating to Los Angeles in 1983, Tufano realized the stateside significance of that picture. He remembers, "What amazed me when I came to America was seeing young people on Sunset Boulevard dressed like mods and driving motor scooters. I thought at first that it was a publicity stunt, and that they'd resurrected the movie, but it seems that *Quadrophenia* is a cult film in the States as well. It was the last thing I ever expected to see, and it was quite amazing." ◆

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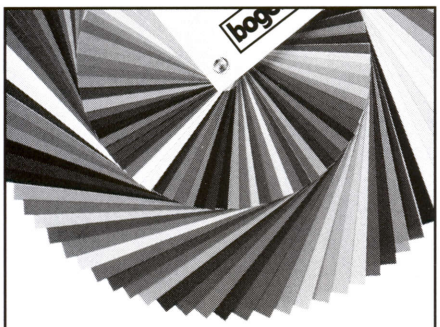

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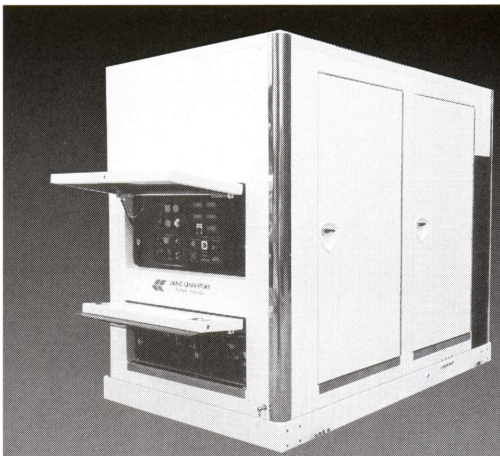

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The *Sea Hawk* Sets Sail

Warners' swashbuckling epic lowers its anchor and finds an enthusiastic audience.

Part 2 of 2

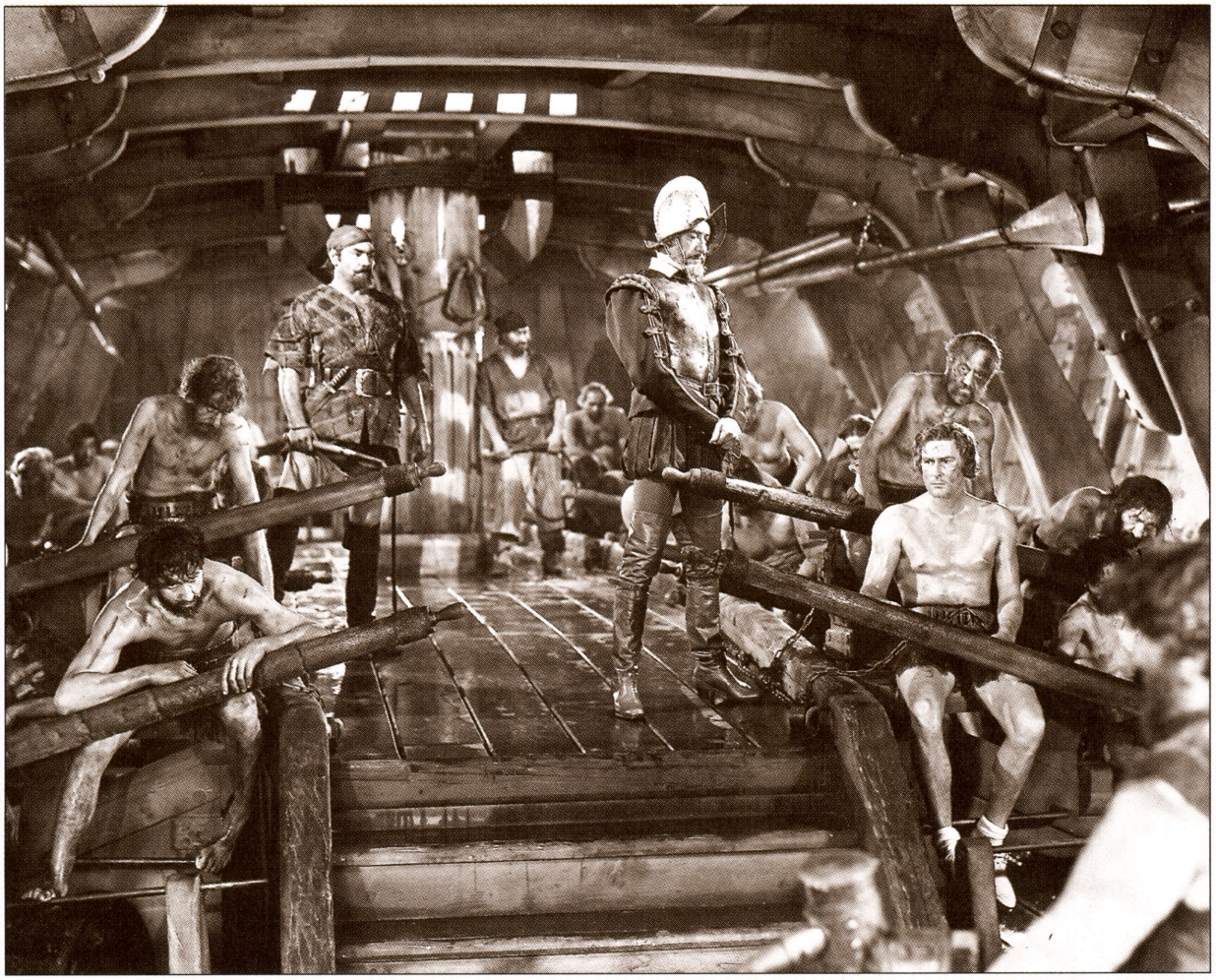
by Rudy Behlmer

In 1935, Warner Bros. executives were so inspired by the success of their Errol Flynn swashbuckler, *Captain Blood*, that they began preparations for a new version of Rafael Sabatini's novel, *The Sea Hawk*. After numerous postponements it finally went before the cameras on February 1, 1940, with *Captain Blood*'s esteemed star-director team of Flynn and Michael Curtiz. Art director Anton Grot and his associate, Leo Kuter, created methods of staging action that involved two full-scale ships in water on the new Stage 21. Prominently cast were Claude Rains, Brenda Marshall, Donald Crisp, Flora Robson and Gilbert Roland. Henry Daniell proved a fine villain, but was unable to handle the swordplay for the climactic duel with Flynn. Through extensive doubling, furious pacing and some imaginative shadowplay devised by Curtiz and cinematographer Sol Polito, ASC, the duel became a visual delight.

By mid-March, the spectacular battle scene that takes place near the start of the film,between heroic privateer Goffrey Thorpe's (Flynn) ship and the Spanish galleass, near the opening of the film was being shot on the marine stage. Associate producer Henry Blanke sent a memo to executive producer Hal B. Wallis on March 14 in which he outlined the footage that could be lifted from the 1935 *Captain Blood:* shots of men swinging from ship to ship during the battle, close-ups of cannons firing, and clips showing the devastating effect of the cannons on the ship. In addition, he made use of some medium and long shots of general battle and men falling into the water from *The Divine Lady* (1929), a rather lavish First National Picture about Lord Nelson and Lady Hamilton, which had also been re-used in the 1935 *Captain Blood.* The fact that there was a discrepancy of roughly two centuries between the respective time periods of *The Sea Hawk* and *The Divine Lady* seemed to bother no one.

After the battle between the two ships, all of the galley material was photographed on Stage 3. Scenes taking place in a galley with slaves shackled

Filming the palace garden scene on the Warner backlot. Lefthand photo, left to right: Brenda Marshall, Errol Flynn, Sol Polito, ASC (leaning under camera), assistant cameraman Frank Evans and director Michael Curtiz (with hat and top coat). (Author's Collection.) Right photo: Brenda Marshall and Errol Flynn in the backlot palace garden set. (Courtesy: AMPAS.)



On Stage 3, the actors row their way through the famous galley sequence. Left to right: Harry Cording (standing), Pedro de Cordoba (in Spanish uniform) and Errol Flynn (behind oar). (Courtesy: USC Cinema-TV Library.)

and rowing to the beat of the timekeeper's drum were relatively novel in 1940. The silent *Sea Hawk* and *Ben-Hur* (1925) had key episodes during which the hero of each of these dramas spent time at the dreaded oars, but those had been staged years earlier and without dialogue.

Wallis was concerned about the amount of whipping that the rower-slaves were enduring on camera. "As you know," he wrote Curtiz, "we have been cautioned by the Hays Office against too much brutality, and the way you have been shooting the stuff, we won't be able to cut it out. You have far too much of it, and it's going to become offensive and repulsive."

Filmed next was one of the picture's most imaginatively directed and photographed scenes: that of Thorpe and his men freeing themselves from the galley. After a detailed escape from the shackles and chains, the men cautiously proceed with their operation on the deck of the Spanish ship, *Madre de Dios.* Wallis wrote the following to Curtiz on April 1: "I just want to be sure. . . that you do not have any battle scenes — but rather do this all in a sinister, mysterious fashion, with just shadowy figures coming over the rail, dropping down on the deck, crawling around corners of hatches, and stealing up on individuals and Spanish sailors... Be sure that this is all done in sketchy lighting..."

Meanwhile, Curtiz continued to embellish the opening battle scene between the two ships whenever the opportunity arose. His preproduction claim that he would not be able to shoot a fight better than the one in *Captain Blood* was conveniently forgotten. On April 3, Wallis wrote to Blanke and studio production manager Tenny Wright: "I notice in today's dailies that Mike is still shooting scenes from the first battle, this time from other angles with the camera down in the foreground and the water in the tank and the guns still firing. I thought that we were all through with this battle... I wonder how it is that Mike is permitted to schedule another day's work on the stage..."

Wallis seems to have had a "love-hate" professional relationship with Curtiz. The communications to and about Curtiz from him during the making of many of the director's films at Warners were similarly fault-finding and exasperated. Yet Wallis invariably chose Curtiz to handle many of the studio's better (and in many instances "bigger") projects. They were quite friendly off the lot as well. It is more than apparent that the relationship worked, as it usually yielded excellent results. Curtiz's embellishments of the big scenes in his pictures gave the productions a richness and visual excitement that contributed strongly to their timeless appeal. The producer, on the other hand, who was responsible for turning out a considerable number of films per year, had to equate

Near right: ***Miniature ships for the 1940*** **Sea Hawk** ***were photographed by Hans Koenekamp, ASC, on the Warner lake at the Burbank studio. (Courtesy: AMPAS.) Far right: A sketch of the Panama sequence by assistant art director Leo Kuter. (Courtesy: AMPAS.)***

time with money and operating efficiencies.

The last scene on the shooting schedule was the Panama episode, during which Thorpe and his men intercept a Spanish treasure train in the jungle, only to be later intercepted themselves by other Spaniards. A few blocks from Warners' Burbank studio at the time was some studio property known as "30 Acres." Art director Anton Grot had 500,000 square feet converted into a jungle. Tropical plants, trees, and vines were brought to the area and a 4 ½-inch water line was laid down, through which the land was flooded to create a jungle swamp. To give the illusion of dense, dank heat, Grot provided fog machines that poured vapor over the "jungle" (cold water held the vapor close to the ground).

The scenes at the Venta Cruz marketplace and the interior of the treasure-house were photographed on a set constructed for the 1939 *Juarez* at the Warners' Calabasas Ranch several miles west of Burbank. The brief shots showing Thorpe and his party finally arriving at the shoreline from their escape through the swamps was filmed on the beach at Point Mugu, west of Los Angeles. Other scenes depicting the exterior of a Dover Street and a dock, the palace garden, palace gate, and the exterior and interior of the chartmaker's shop were all shot on the backlot using standing sets.

Meanwhile, on Stage Five, Warners' legendary special effects department (under the supervision of Byron Haskin, ASC) was preparing and filming the miniature ships for the distant shots that were eventually to be integrated into the sequences involving the closer angles of the full-scale ships already photographed on Stage 21. This unit also was responsible for the rear-projection process and matte-painting shots. The ships, built at a scale of at least one inch to the foot, were carefully crafted to tie in with their full-scale counterparts.

In 1979, Haskin revealed that each miniature ship concealed an operator, who, from a prone position, would guide the rudder and work the little inboard motors and the tiny cannons. Hans F. Koenekamp, ASC, regarded by Haskin as "the greatest trick man who ever lived," photographed the miniature ships on Warners' backlot lake (in front of a painted sky background) next to the new maritime stage. The camera was rigged very close to the water level in a glass box and the ships were photographed in slow motion (at approximately 70 fps) in order to create the proper illusion. For a realistic effect, it is important to have the miniatures as large in scale as possible — particularly when working in conjunction with water or fire, which are always potential giveaways in miniature work. Fortunately, in 1935, the effects department (then under Fred Jackman, ASC) had already experimented with many miniature ship shots for *Captain Blood*.

By 1937, Haskin had developed an apparatus for forming artificial waves at the bow and stern of miniature ships in order to simulate actual travel of a full-sized craft through water. The waves previously produced by miniatures were not of the proper size, shape, or proportion in relation to the miniature's

scale. If the miniature ship was towed at a very low speed, virtually no waves were produced. The new apparatus was used on *The Sea Hawk's* miniatures.

After filming for 68 days, some 20 days over schedule, *The Sea Hawk* wrapped on April 20.

Erich Wolfgang Korngold, under contract to Warner Bros., was set to create the music, which would turn out to be his last score for a swashbuckler. One charming melody, which appeared to be sung on camera by Brenda Marshall, was actually prerecorded by Sally Sweetland (nee Mueller); Korngold later developed it into an art-song that became part of his Opus 38. A waltz he had written for *Danton*, an unproduced 1936 Warners film, was transformed into a quietly apprehensive march used in the jungle scenes. Over the course of several days, Korngold and the Warner orchestra of 54 players recorded the superb score in 58 hours.

Just before the film's debut in the summer of 1940, serious thought was given to coloring the film's Panama sequences green in release prints. Wallis then wrote Jack L. Warner on July 11: "[Editor] George Amy brings up a point that I think is very well taken. That is, that green is a cooling color. . . It is entirely possible that by putting this green tint on the film, we are apt to get just the opposite effect than we want, namely, a feeling of coolness instead of one of terrific heat. An amber or perhaps a straw or yellowish tint

might be even better, but I think in order to be safe we should let the print alone just as it is — black-and-white." In some of the initial release prints, however, the Panama sequences were rendered in sepia tones.

On July 17, 1940, a 127-minute cut of *The Sea Hawk* was previewed by press and industry members at Warners' Hollywood Theater. One month later the film was in first-run release with the length intact. Most reviewers praised the production in general and the action scenes specifically, but some thought the episodes of court intrigue tended to diminish the effect of the epic sweep.

Although *The Sea Hawk* lacked the perfect timing and fresh impact of the 1935 *Captain Blood* (this kind of subject had been dormant for years), and the legendary charm, color, and overall romantic perfection of *Robin Hood,* it was, and still is, a first-rate example of its genre. In terms of physical logistics, the $1,700,000 production is much more opulent than the cautious, relatively economy-minded *Captain Blood* of five years earlier.

To make sure that there was no confusion about the kind of film *The Sea Hawk* was, the studio prepared extensive advertising and exploitation that emphasized its kinetics. The words "Flynn in Action!" were splashed across the cover of the pressbook.

The critics noted the parallels of the film with the dire European political events of 1939-40. Like the arrogant Hitler, King Philip of Spain states in the script that conquest will cease only when the entire world is under his control. Also, the appeasement policy at Elizabeth's court was similar to the appeasement attempts in the late 1930s by Prime Minister Chamberlain and others. Some of Elizabeth's counselors insisted that Spain would not attack, that the building of the Armada was not aimed at Britain, and that the safety of England depended upon yielding to all demands. During the writing, production, and release of *The Sea Hawk,* events in Europe moved rapidly. By July of 1940 England was facing invasion.

The British release prints of *The Sea Hawk* contained a closing speech by Elizabeth not included in the American version. In part, the queen speaks of preparing the nation for war after trying to avert one. The 1947 reissue of the film (with 18 minutes cut), coupled with the similarly shorn *The Sea Wolf* (1941), did exceptionally well during the period following World War II, when box-office receipts were down and many revivals were making the rounds.

Warners continued to get mileage out of the footage shot for *The Sea Hawk* (and *Captain Blood* as well). On October 2, 1956, "Condemned to Glory," a one hour episode of *Conflict,* an ABC-TV series produced by Warners, managed to rework the plot of *The Sea Hawk* with new players, old costumes, fragments of old sets, and an abundance of stock footage from the 1940 film. The vintage scenes were matched up with new footage of Geoffrey Toone and Jorja Curtright, substituting for Flynn and Flora Robson, along with various other players performing similar duty. A few weeks later *Conflict* presented "Captain Without a Country," a reworked *Captain Blood* utilizing a significant amount of stock footage from the 1935 feature.

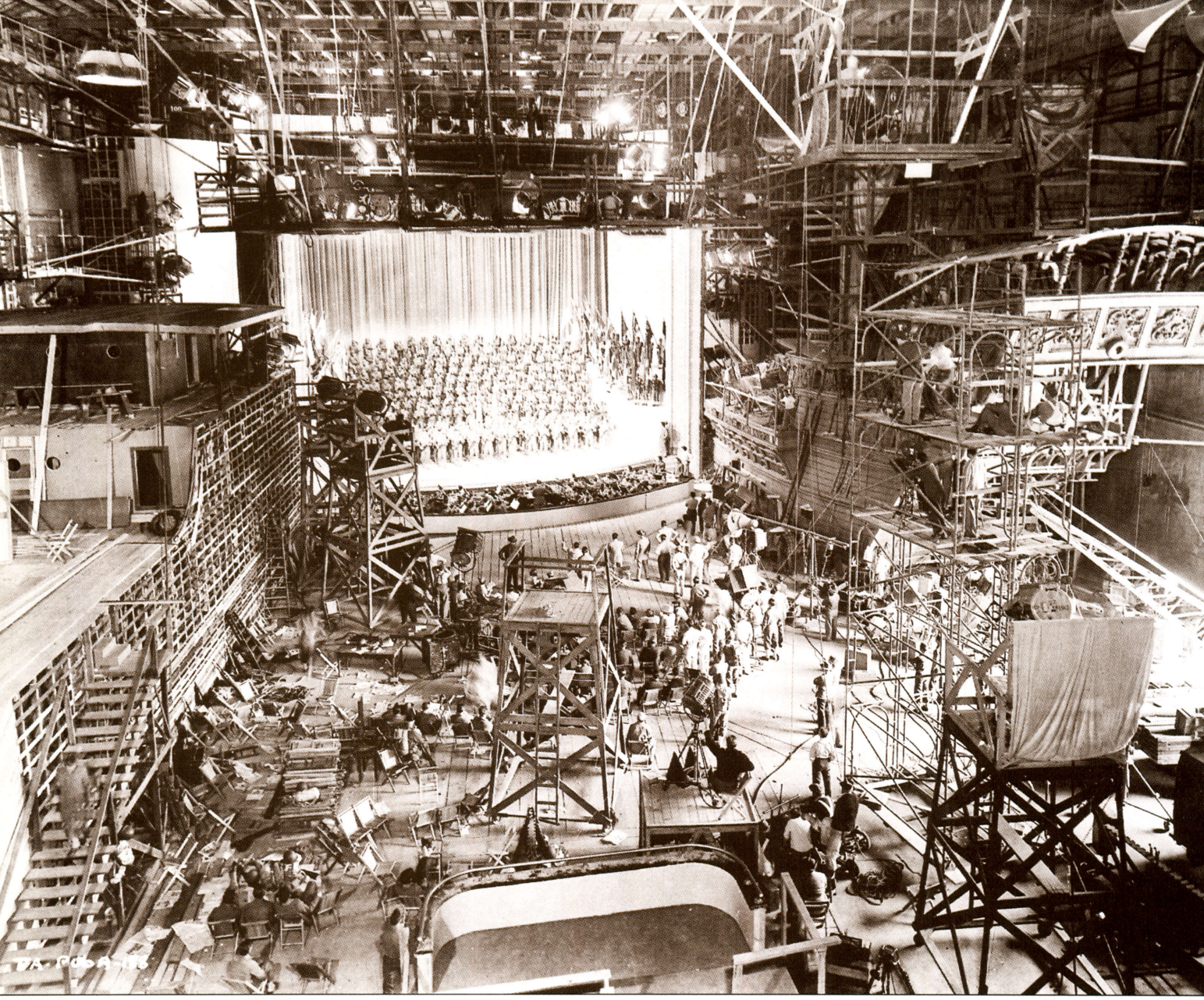
In 1986, CBS/Fox Video issued Warners' British release version of *The Sea Hawk,* which included the longer version of Elizabeth's closing speech and another sequence with Flynn, Alan Hale, and Donald Crisp, during which Crisp's character brings a message from the queen, asking Captain Thorpe to set sail for Panama earlier than planned. None of the aforementioned scenes had ever been seen domestically. After a prolonged search, this version had been found at the British Film Institute and the BBC in England. Prior to this, the video version was of the truncated 109-minute theatrical reissue from 1947. All currently available videos (including a 1986 MGM/UA colorized VHS and the black-and-white 1990 MGM/UA laserdisc) utilize the extended British version. In the summer of 1995, a commercial for Miller Genuine Draft beer was built around footage of Flynn and company escaping from the galley.

Emblazoned across the cover of* The Sea Hawk's *pressbook was the phrase "Errol Flynn in Action!" The film lived up to its billing in spectacular fashion. (Author's Collection.)

After the 1940 Hollywood preview of *The Sea Hawk,* Max Reinhardt, the world-renowned innovative Austrian theatrical director, sent a congratulatory telegram to his friend and old associate, Henry Blanke, which he concluded by saying, "It is a marvelous realization of our boyhood dreams."

Credits

A Warner Bros.-First National Picture. *In charge of production,* Jack L. Warner; *executive producer,* Hal B. Wallis; *associate producer,* Henry Blanke; *directed by* Michael Curtiz; *screenplay by* Howard Koch, Seton I. Miller; *director of photography,* Sol Polito, ASC; *art director,* Anton Grot; *assistant art director,* Leo Kuter; *dialogue director,* Jo Gra-



Two full-scale ships in "dry dock" on Stage 21.

ham; *film editor,* George Amy; *sound,* Francis J. Scheid; *costumes,* Orry-Kelly; *makeup artist,* Perc Westmore; *special effects* by Byron Haskin, ASC, H.F. Koenekamp, ASC; *music composed and conducted by* Erich Wolfgang Korngold; *orchestrations by* Hugo Friedhofer, Milan Roder, Ray Heindorf, Simon Bucharoff; *musical director,* Leo F. Forbstein; *fencing master,* Fred Cavens; *technical advisers,* Ali Hubert, Thomas Manners, William Kiel; *running time, 127 minutes; released August 1940.*

Goffrey Thorpe, Errol Flynn; *Dona Maria,* Brenda Marshall; *Don Jose Alvarez de Cordoba,* Claude Rains; *Sir John Burleson,* Donald Crisp; *Queen Elizabeth,* Flora Robson; *Carl Pitt,* Alan Hale; *Lord Wolfingham,* Henry Daniell; *Miss Latham,* Una O'Connor; *Abbott,* James Stephenson; *Captain Lopez,* Gilbert Roland; *Danny Logan,* William Lundigan; *Oliver Scott,* Julien Mitchell; *King Philip II,* Montagu Love; *Eli Matson,* J.M. Kerrigan; *Martin Burke,* David Bruce; *William Tuttle,* Clifford Brooke; *Martin Barrett,* Frank Wilcox; *Walter Boggs,* Clyde Cook; *Eph Winters,* Herbert Anderson; *Inquisitor,* Fritz Leiber; *Ben Rollins,* Edgar Buchanan; *Monty Preston,* Ellis Irving; *Kroner,* Francis McDonald; *Arnold Cross,* Charles Irwin; *Captain Mendoza,* Pedro de Cordoba; *Peralta,* Ian Keith; Lieutenant Ortega, Jack LaRue; *Astronomer,* Halliwell Hobbes; *Captain Ortiz,* Frank Lackteen; *Chartmaker,* Alec Craig; *General Aguerra,* Victor Varconi; *Martin Frobisher,* Robert Warwick; *John Hawkins,* Guy Bellis; *Lieutenant,* Lester Matthews; *Slave Master,* Harry Cording; *Drum Beater,* Art Miles; *Slave Master,* Nestor Paiva; *Sea Hawk,* Michael Harvey; *Native,* Harry Silversmith; *Maids of Honor,* Elizabeth Sifton, Mary Anderson; *Spanish officer,* Gerald Mohr; *Whippers,* Dave Kashner, J.W. Cody, Anthony Warde; *Fencing Doubles,* Ralph Faulkner, Don Turner, Ned Davenport.

Resources:

University of Southern California; Warner Bros. Archives (Stuart Ng, Bill Whittington); Warner Bros. Papers; Margaret Herrick Library; Academy of Motion Picture Arts and Sciences (Robert Cushman, Sam Gill, Howard Prouty, Stacey Behlmer, Val Almendarez, Frans Offermans); Leo Kuter Collection, Hollywood Museum Collection, Hal Wallis Collection; Perc Westmore Collection; University of Southern California, Cinema-Television Library (Ned Comstock); Mac Julian Collection; University of California, Los Angeles, Research Library, Department of Special Collections (Anne Caiger); Anton Grot Collection; Wisconsin Center for Film and Theater Research (Tino Balio, Diana Cook, Maxine Fleckner Ducey); Warner Library. And thanks to Marc Wanamaker, Carl Stucke, Leith Adams, and Richard P. May.

Filmmakers Freshen Glade Campaign

by Mary Hardesty

To introduce the new Glade Candle Air Fresheners, Curious Pictures director Randy Akers asked director of photography Joe Pender to help him seamlessly knit together four vignettes to simulate a single, continuous camera pan.

The 30-second spot, "Song," features the candle air fresheners in the foreground of scenes showing people working, relaxing and entertaining. The challenge for Pender was that the budget did not provide for a complete motion-control system.

"This project was a comedy of errors in a lot of respects," Pender recalls about the three-day shoot. "We tried a number of different dollies and actually had a dolly and track shipped from Hollywood to our studio outside of Toronto. Even that didn't work out as well as we had hoped.

"To make these moves work, the camera had to be rock-solid," the veteran electrician-turned-cameraman explains. "Without renting the motion-control mechanism that ties the camera into a motorized, computerized situation, this type of shooting can be very challenging. You can't hide any flaws in the motion of the track. Any movement on the floor is transmitted to the camera, and the whole image shakes."

To eliminate the shake, Pender came up with a combination of tricks to create, in essence, a poor man's motion-control rig. "We ended up using a motion-control dolly on a motion-control track without renting the motion-control mechanism."

According to Pender, the question to ask when renting a dolly for filming seamless scene transitions is, "Does it have steel or rubber wheels?" He notes, "Rubber wheels like you find on the Chapman or Fisher dollies have too much flex, so after we tried a few rubber-wheeled versions, we switched to a ball-bearing wheeled dolly that we rented from a Canadian special effects guy who is based out of Toronto. It was really just a flat aluminum platform with 15-20 bearings per corner, bolted onto the bottom. It worked because it gave us steel on steel." Pender also used steel shims instead of the usual wood shims to eliminate any flex between the track and floor.

Pender says that once the motion between the ground and the base of the camera was eliminated, the rest of the shoot was fairly straightforward, if a bit tedious. "For me, it was a different type of challenge because it was very technical," recalls the cinematographer, a 10-year veteran of commercials who is better known for more spontaneous shooting.

To make the commercial completely seamless, Pender also had to ensure that the dolly remained at a constant speed throughout the three-day shoot. "Seamless photography is somewhat creatively restrictive because of this," Pender explains. "You need to practice moving the dolly to the designated place in exactly the right number of seconds. Let's say in the first scene you want to move 60 feet in four seconds and the next scene calls for moving 75 feet in five seconds. This means you have to reset everything and practice moving the dolly to get it just right before you shoot each scene, which involves a lot of rehersal as well as mathematical calculations."

To help with the challenging dolly movement, the special effects technician devised a motor-driven system that tied into the dolly. "The dolly was tied to a 620 motor with a high-tech polymer chain to make the movement as smooth as possible," Pender explains. "We could time our moves down to an eighth of a second."

Pender points out that despite such preparations, there will always be a slight movement when shooting this way; he suggests shooting a bit wider than required for the finished spot. "If your frame lines are too tight to begin

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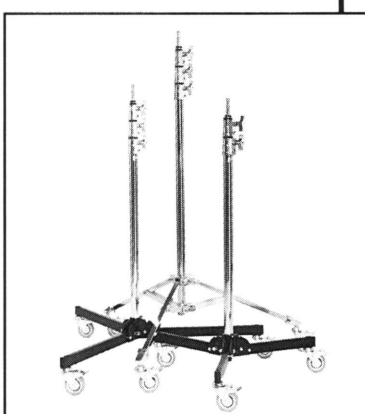

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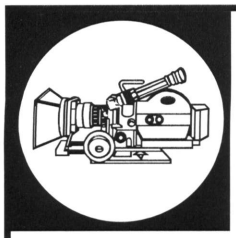

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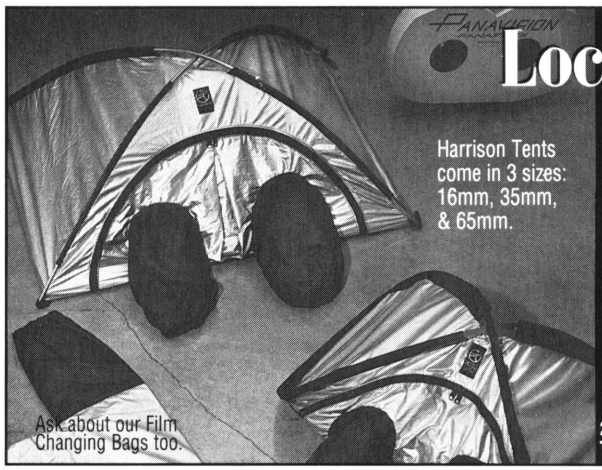

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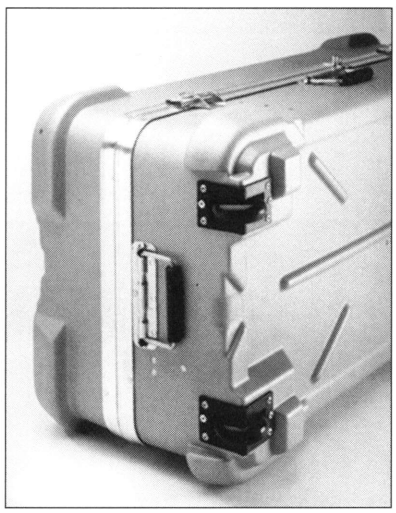
with, you have no place to go," he cautions. "Shooting a bit wider than necessary lets you get inside the image in post and stabilize it. Up to a certain point, you can see with the human eye that the camera is shaking; the problem with using this poor man's motion control is that it can look great on stage, but when you get the dailies you may still see movement. We had to track out quite a bit of movement in post using the Harry, and that cost a lot of money. In hindsight, after all of that trial and error, we probably ended up spending about as much money — with more headaches — as we would have if we had gone with a full motion-control dolly from the beginning."

Pender also points out that this setup doesn't allow a cinematographer to pan or tilt and make seamless moves. It's also necessary to use the same lens size and keep the same height off the ground from shot to shot. A further requirement is a dual-pin-registered camera; even though he is a self-proclaimed "Arri man," Pender went with a Panavision camera because the Arri B1 not only was not dual-pin-registered, but was too restrictive speed-wise.

"The tricky part was that we needed extremely long-lens shots to marry the foreground, background and transition pieces, as well as footage that smoothly matched speed-wise, and that wasn't really possible using long [prime] lenses or an Arri." Pender shot using the 11:1 Primo zoom and Kodak 5298 stock. "I would have loved to have used 400mm lenses to compress the images, but the stage we were on — at Kleinburg Studios, just outside Toronto — wasn't long enough," says Pender. "Most of the time the set was on one end of the stage and we were crammed up against the other end. Next time we'll have to find a larger stage." ◆

Spot: "Song"
Product: Glade Candle Air Fresheners
Production Company: Curious Pictures
Director: Randy Akers
Agency: Foote, Cone & Belding, Chicago

compiled by Andrew O. Thompson



Arriflex Compact Fresnels, New Lighting Kits

Arriflex has introduced the Compact 6000W HMI Fresnel, a light that utilizes single-ended lamp technology. The new 16 ¾ " Fresnel lens allows the new 6K to offer increased light output and superb optical performance. The Compact 6000W produces 6800fc in spot at 25 feet, or 425fc in flood. Fixture size and weight (66 pounds) have been reduced for easy handling, while Arri's traditional aluminum extrusion and cast construction provides reliable performance.

Arriflex has also announced a new wheel design for their lighting kit cases that brings studio control to field production. The new Arri Hot Wheels are rugged rollerblade wheels rigidly mounted in the molded case. Fully loaded kits roll easily and quickly, and the wheels no longer have to be removed during shipping.

Arriflex (818) 841-7070, FAX (818) 848-4028.

SpaceCam Gyro-Stabilized Camera Platform

SpaceCam Systems introduces a gyro-stabilized camera platform for 65-15 and 65-5 film formats. With its Academy-Award-winning patented gimble, the SpaceCam is especially suited to large format wide-angle cinematography. The SpaceCam's powered-gimbal joint and backlash-free pan and tilt drives allow for it to be operated in an open-front "Bubble Wave" dome. This dome permits filming with 180-degree angle of view lenses at helicopter or camera car speeds of up to 100 miles per hour. The SpaceCam platform utilizes the MSM 9801 Imax Light Camera with SpaceCam's own Constant Center of Gravity 65mm magazines, which permit the use of 100-foot loads. Filming can be accomplished at speeds from 2 to 30 frames per second. The Imax/SpaceCam platform is currently available for use on the MD-500 helicopter. The platform is mounted on the nose and employs SpaceCam's unique "action arm" attachment for additional helicopter maneuverability.

SpaceCam Systems, Inc., (818) 889-6060, FAX (818) 889-6062.

Aerial Camera

British-based Hover-Cam Limited has developed a camera-carrying, scaled-down helicopter (five feet long) that can capture images from positions that are physically unreachable by such conventional camera carriers as cranes or full-size helicopters.

Fitted with a gyro-stabilized camera that can tilt and swivel, the Hover-Cam allows a filmmaker to position the camera almost within touching distance of moving or static objects. The miniature helicopter can fly above and around participants in the scene and can operate inside structures, around bridges or just a few centimeters above any surface, be it land or water.

The technique combines advanced aeronautical, electronic and control-systems engineering with the skills of a ground-based pilot, camera operator and engineer. The camera operator is in constant radio link with the pilot and works alongside a creative director who can "fly" with the camera using a live video link microwaved from the helicopter to its control vehicle.

The system can operate with video, 16mm or 35mm cameras. The company's twin-engined miniature aircraft are operated within visual range of the pilot, giving them an effective working radius of 400 meters. This apparatus is complemented by a full-size helicopter adapted to carry a fully equipped film or video camera operator.

Hover-Cam Limited, (44)1752-672511.

Versatile Camera Car

Innovision Optics has introduced the miniature Radcam camera car. Designed by director Kevin Dole, this vehicle captures high-speed, low-angle action and records scenes never before possible in real time. The camera car is completely wireless and equipped with four-wheel independent suspension.

Says designer Dole of his invention, "When shooting for a young audience, it's important to see the world through their eyes. When I was a kid, I played with toys while lying on the floor so that many cars and trucks looked huge and heroic. Capturing the drama of that angle, with speed, and maneuverability is the purpose of the Radcam car."

Just like a full-sized camera car, the Radcam car allows the camera to be positioned in the front, rear, left, or right side of the vehicle. The lens can be as low as one inch off the ground or as

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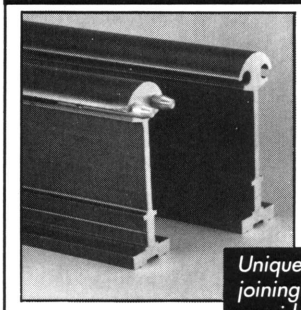

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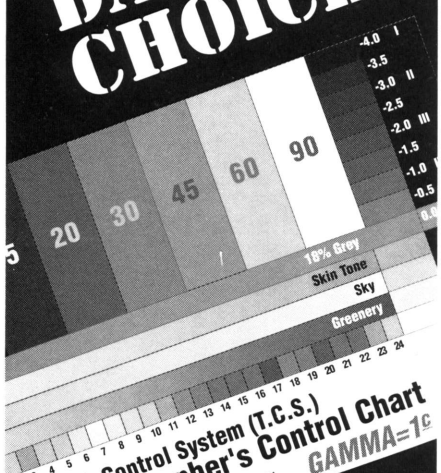

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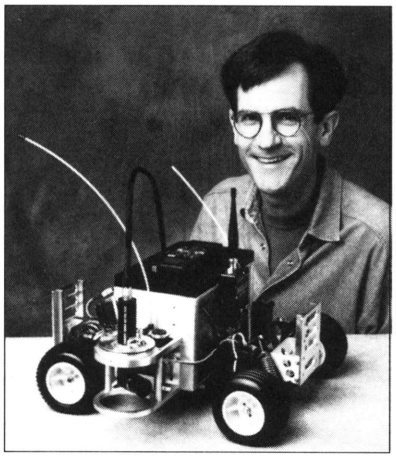


high as 15 inches. One person acts as the driver, using a radio controller to adjust the speed and steering of the car. The camera operator wears a video headset that displays the live image seen by the camera. Using a second radio controller, the operator adjusts the pan and tilt of the camera as the car travels. The camera's image can also be displayed live on a full-size monitor.

Innovision Optics, (310) 394-5510, FAX (310) 395-2941.

Sony Remote Cameras

Sony Electronics recently announced the launch of its DXC-950 remote video camera. The DXC-950 incorporates state-of-the-art technologies while retaining all of the advanced features of its predecessor, the DXC-930. Now equipped with a built-in RS-232 interface, this camera can be controlled remotely from an external computer using an eight-pin connector. It has also adapted Sony's newly developed Power HAD CCDs, providing higher resolution and signal-to-noise ratio. With Power HAD, less light is needed to illuminate a picture, significantly improving the sensitivity over one f-stop and dramatically reducing red streak caused by bright lights. Strobe synchronization functions enable the DXC-950 to be easily incorporated into a "machine vision" application for computerized color adjustment and pre-press photo inspections. This function also simplifies system integration resulting in reduced setup costs. The DXC-950 is an ideal complement to government and military remote surveillance systems; it is extremely reliable when gathering scientific data in environments not conducive to humans, and provides high-quality images for independent photography studios and graphics houses. In addition to being easily integrated into any industrial video system, the camera also lends itself to basic "in-the-field" broadcasts such as weather reports and sporting events.

Sony also introduced its new DXC-9000 3-CCD color video camera. The DXC-9000's progressive-scan technology allows the camera to record all the pixels in an image frame in 1/60 of a second. As a result, the camera dramatically reduces blur and captures clear, high-resolution images of moving objects. Since images are recorded as square pixels, this camera is ideal for computer graphics applications, where square pixels help to avoid aliasing and provides for clear image capture and manipulation.

The DXC-9000 is equipped with three half-inch IT (Interline Transfer) HyperHAD CCDs, and provides high resolution and an outstanding signal-to-noise ratio. To allow the camera to capture images in a variety of lighting environments, the DXC-9000 is also equipped with three white-balance control modes: AWB (auto white-balance); ATW (auto-tracing white-balance) and manual (R/B gain).

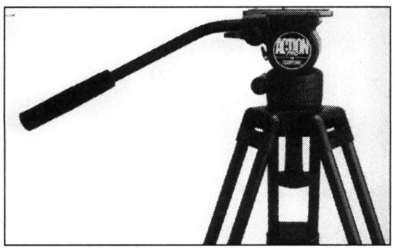
Designed to offer clear, high-quality images for computer graphics applications, the DXC-9000 also enables two freeze options due to a built-in frame memory: continuous freeze mode and freeze/source change mode. These options allow the user to choose how an image is captured and presented to the computer or viewed on a monitor. With a pre-installed RS-232C interface, the camera can also be controlled remotely from an external computer using an eight-pin connector, making it ideal for remote-viewing applications such as weather and traffic reporting/monitoring.

Sony Electronics, (800) 472-SONY.

Fluid Head/Tripod System

Cartoni introduces ActionPro, a lightweight fluid head/tripod system offering professional features for digital cameras, as well as sophisticated Hi-8 and Super VHS cameras weighing up to 12 pounds. Cartoni's patented, award-winning fluid modules are employed for both pan and tilt modes. A variable friction device offers selected fluid drag from free-wheeling to lock-off.

Counterbalance is achieved by



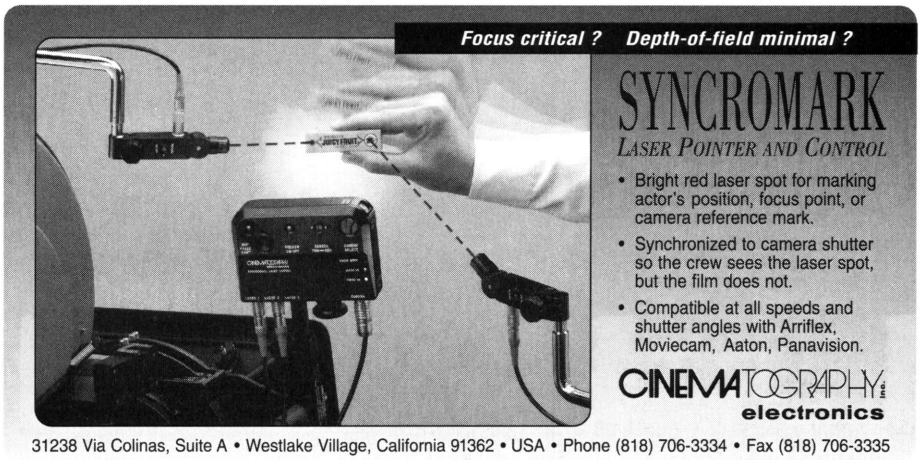
the fluid module alone for cameras weighing up to three pounds. For heavier cameras, a double spring module can be engaged and set to any of three settings to compensate for various payloads.

Featuring positive-locking tilt, orientable pan bar, spirit level and built-in shoulder strap, the ActionPro head is supported by a standard aluminum tripod with a 75mm ball base and rubber feet. The system comes complete with fluid head, quick-release sliding camera plate, tripod and integral mid-level spreader.

Cartoni, (805) 520-6086, FAX (805) 520-6949.

Image Intensifiers and Macro Lens

OpTex has introduced the Series 2000 generation of image intensifiers based on the type extensively by U.K. and U.S. news crews during the Gulf War for nighttime newsgathering. They are available in three versions, each of which can be supplied with either a 2nd Gen Plus, SuperGen or SuperGen HP intensifier tube. The 2000-B4 is for use on Sony 2/3" B4-type-mount ENG/EFP cameras and offers the videographer excellent possibilities for night vision. Located between any B4-mount lens and the camera, the intensifier is powered from the camera's on-board battery via the module's lens/power cable; at the same time, the lens cable is plugged into the intensifier, thus retaining its own electronic functions. The 2000-B4 is fitted with a fail-safe feature that disables it once the power has been switched off, thus preventing irreparable damage should the power be switched back on in



35 MM REFLEX

The Fries model 435 is a new general purpose MOS production 35mm camera. With its optical printer compatible register pins, steadiness and 150 FPS speed. The 435 is ideally suited for special effects, commercials or any photography where a quality steady image is desired.

The 435 is a spinning mirror reflex camera with a 170 degree blanking shutter. The internal 30VDC motor runs the camera from 2 to 150 FPS forward and 2 to 50 FPS reverse, in one frame increments all crystal. The camera is equipped with take-up and supply torque motors.

There are both 1000 ft. and 400 ft. displacement type magazines. A new feature is the light valve which allows the operator to direct all the light to the viewing system, or to the video assist, or combo which splits the light between both viewing and video assist.

35 mm, Reflex Camera

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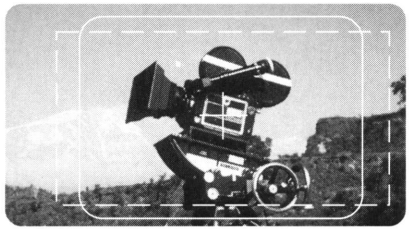

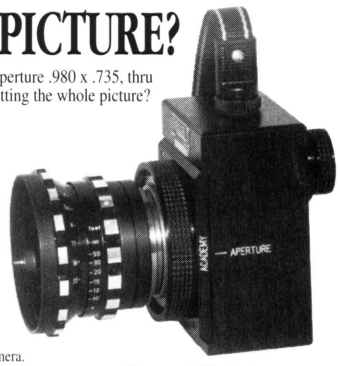

Film Clip: The finder has a set of register pins that will hold a film clip the same as the Fries camera.
Groundglasses: Interchangeable. The same groundglass as is used in the Fries 35R and 35R3 cameras.

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The C-563CLS, C-562CL and C-561 feature a 14X, f1/2 zoom lens and the C-560C feature a 12X, f1.6 zoom lens. Both models provide a powerful and extensive focal-length coverage with variable-speed zoom control. Zoom speed ranges from two to 14 seconds. In addi-

tion, the Minolta Master C-563CLS offers 2X digital zoom which doubles the maximum 14X enlargement, for a 28X total image enlargement.

The C-561 and C-560C camcorders offer precise automatic focus as well as power-assisted manual focusing. Both models feature viewfinder and LCD panel readouts.

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With the C-563CLS, C-562CL and C-561, the videographer can pre-select up to eight scenes for automatic editing from camcorder to VCR, in any desired order. Also, this model offers a multi-brand remote control, a unique card-shaped device which operates the camcorder and can control the basic operations of most VCRs on the market today. Additional creative functions include title and character generators. The built-in character generator allows videographer to superimpose an original message up to 18 characters long.

Other artistic features include animation, time-lapse, cinema mode and fader. In addition, the C-563CLS offers five different fading effects (black, blue, mosaic, shutter wipe, slide wipe). These features change the look of the video for more dramatic and creative effects.

All Minolta Master VHS-C camcorders offer comfortable, precision-balanced grips for maximum stability. All four cameras come fully equipped with an AC adapter/charger, battery pack, shoulder strap and cassette adapter.

Minolta Corporation, (201) 825-4000.

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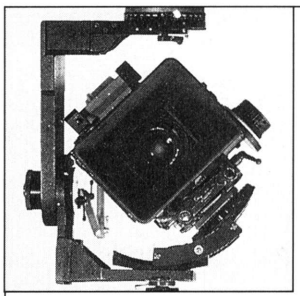

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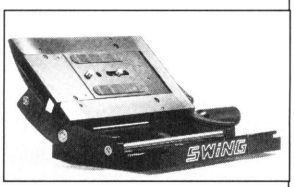

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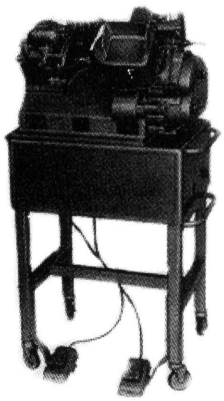

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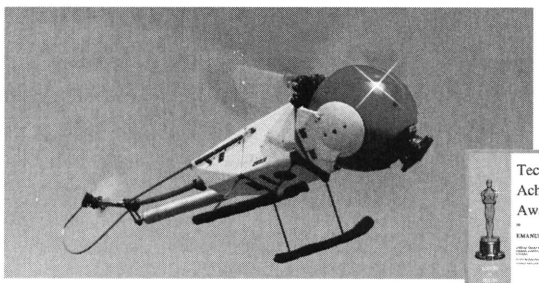

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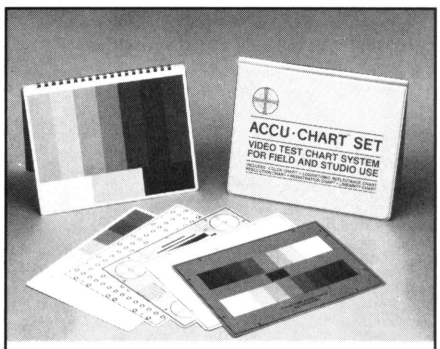

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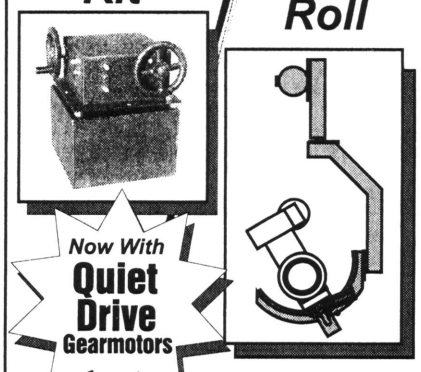

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Tom Krueger Shoots *Manny & Lo*

by Brooke Comer

Tom Krueger was pleased, but not all that surprised, when he was hired to shoot his first feature film, *Manny & Lo.* After all, he'd proven himself in commercials and music videos, he'd shot the director's short film *Best Offer,* he was willing to work on a shoestring budget, and most important, he had connections: director-writer Lisa Krueger is his sister. "At first," he admits, "Lisa came to me out of necessity. She knew I'd give 500% more than a director of photography off the street."

She eventually found a producer, Dean Silver, who brought in the funding. Suddenly, she had a budget.

The Krueger siblings enjoyed an unusual director/cinematographer rapport not just because of their relationship. Says Tom, "Lisa could throw out a reference that nobody else would understand the same way I would." The two approached filmmaking from different routes; Tom gained experience in the field as an assistant to the likes of Steadicam master Garrett Brown, while his sister mastered the academics of film in graduate work at the Sorbonne, then worked as a script supervisor for Jim Jarmusch and James Ivory. "We've paralleled each other in our careers, but we've always had a special kind of communication," Krueger explains.

Manny & Lo, the story of two runaway sisters, is, according to the cinematographer, "a mythic sort of fantasy that captures the magical feeling of childhood. And since Lisa and I had shared the same childhood, we had the same understanding of that feeling."

Krueger went to work with a modest lighting package, as well as a Panaflex Gold (he and co-producer Marlon Hecht had a previous relationship with Panavision, who "believed in the project and really helped us out"), and Zeiss Superspeed lenses, which he chose after extensive tests. "I liked the sharpness and contrast that the Superspeeds lent to the image, which also helped create shadows," says Krueger. He chose his stocks, Kodak's 5293 and 5248, for interiors and exteriors respectively, because of their natural contrast. The combination of the stocks and the Superspeed lenses helped him to create this shadowy sense of fantasy, mystery and adventure when Manny and Lo enter their new world.

Lighting changed as the film progressed. "In the first act," says the cinematographer, "Manny and Lo are parentless, on their own, modern casualties of American suburbia. We made suburbia very bright, with artificial colors, fluorescent-type lighting, and very little shadow. When they escaped to the country, we used filtration and production design to suggest that they were not only in another distinct place, but in another time."

As soon as Manny and Lo enter the country, their surroundings become more mysterious, they have less control, and they are truly lost.

Krueger added to the atmosphere with filtration, choosing an 81D and a chocolate #2 filter, which brought his color temperature down to 3,000 degrees. "It wasn't far from an 85's normal color correction," says Krueger, "but it added more brown as opposed to orange and made everything look older, more monochromatic. That's how we were able to step back in time. And that's also one of the reasons why I chose the Superspeed lenses; shooting at 93 and 48 with chocolate #2 filters brings you down to the very open end of the lens. We shot anywhere between 1.4 and 2.8. That range helped us with focus isolation. Normally when you shoot at the long end of the lens, the focus is really isolated to the character that you choose. But on a wider lens, there's less emphasis on that character, and even when we shot with a 35 or 29mm lens, we were able to keep our focus to a minimum."

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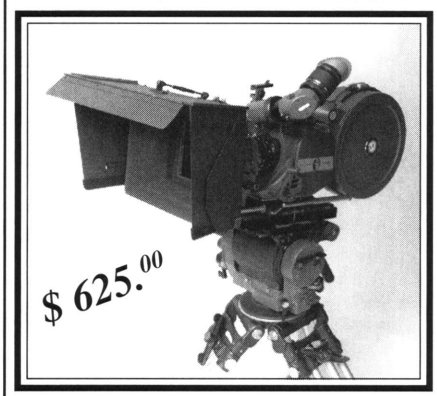

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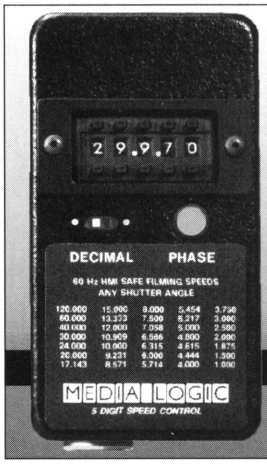

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The country scenes in *Manny & Lo* were filmed in the Catskill Mountains, where Krueger used his chocolate filters to counteract the bright green of the July foliage. "The 81D and the chocolate filter drew a lot of that green out without adversely affecting any of the other earth tones that we wanted to maintain," he notes.

Production had to take place in summer because the two stars were children and their work hours would be restricted during the school year. But even in summer, they could only work nine-hour days. There was no time for blocking; Krueger simply got his actors when they were ready, and then shot. "I'd have to get the master lit without anybody on the set, which wasn't easy. I was blocking based completely on theory, on how I imagined they'd move through a scene."

Krueger also had to imagine how his film looked; he shot without screening dailies, except for some high-contrast prints he viewed when a projector was brought into the lodge where the crew stayed during filming. "The screen was too small and the images too sharp, so I really couldn't gauge my work," he explains. "I tried to work from the gut." Shooting with the chocolate filter and the 81D was a bold choice that the cinematographer wasn't able to adjust during the filming. Fortunately, it worked out the way he'd envisioned.

After working on *Manny & Lo,* Krueger decided that he would be very selective in choosing his next feature project. "I ended up doing a lot more than shooting on this film. I felt responsible for keeping the entire crew's morale up. *Manny & Lo* really took the life out of me, and I only want to give this much again if I feel very, very strongly about the film. I'd rather wait for just the right project than take a film just because it's got a budget and a script." He admits that he and his sister-director got into some heated discussions, but "we just got in there and hammered it out. We actually got along surprisingly well. I only hope she'll have me on the next one."

Meanwhile, the cinematographer continues to do commercial work on both coasts while waiting for the right project to come along. "I do more commercial work in Los Angeles," he explains, "but the scripts I'm interested in shooting tend to come from New York, which is why I chose to base myself here." ◆

Books in Review

by George Turner

Fredric March: Craftsman First, Star Second
by Deborah C. Peterson
Greenwood, 320 pps., library binding, $59.95

It's a curious fact that moviegoers have all but forgotten some of the finest actors of this century while retaining indelible memories of others. One such neglected thespian is Fredric March, recipient of many acting awards (including two Oscars and two Tony Awards), and player of widely varied parts. Over the course of a 40-year career, March contributed more distinguished performances to stage and screen than almost any of his colleagues. But a mention of his name doesn't elicit the response one gets today from the mention of, say, Gary Cooper, Humphrey Bogart, Clark Gable or Spencer Tracy. We remember and cherish these men, whose personalities and mannerisms transcended the characters they portrayed.

Author Peterson notes that March "was *too* good an actor, submerging himself so into the various characters that he was not recognizable or remembered — only the portrayals, those wonderful portrayals. And what better praise for an actor than that of creating for his audience so perfect a characterization that they remember only Dr. Henry Jekyll, Mr. Hyde, Death, Count Vronsky, Anthony Adverse, Jean Valjean, Bothwell, Norman Maine, Dr. Spence, Mark Twain, Al Stephenson, Willy Loman, Dan Hilliard, James Tyrone, Matthew Harrison Brady, and, finally, Harry Hope."

Born Frederick Bickel in 1897 in Racine, Wisconsin, March made his professional stage debut in 1920 and became a leading man on Broadway in 1926. His screen career, aside from some early work as an extra, began with a Paramount contract in 1929. After a small part with Ruth Chatterton in *The Dummy,* he graduated to a romantic role, playing opposite Clara Bow in *The Wild Party.* He alternated between stage and screen with great success during the ensuing years, and starred in more than his share of outstanding vehicles in both venues.

March's 47-year second marriage to his sometime co-star, Florence Eldredge, seems to have been a rockier road than their public realized. It was a union complicated by his incessant womanizing and her lapses of social grace. Their careers were later damaged by false accusations of being Communist party workers.

This account combines direct source materials and interviews with published matter (the latter, however, should be taken with reservations). The book is even-handed, praising March's brilliance without ignoring his foibles, but the author's references to her subject as Fred suggests more intimacy than is warranted. There are valuable lists of stage, screen, radio and TV appearances, but fewer photos than one might wish for.

History of Film
by David Parkinson
Thames and Hudson, 264 pps., paper, $14.95

The number of books published during the past 65 years or so about the history of motion pictures would fill an abundance of shelves. Most, however, run to formula. The early chronicles deal with the industry's various pioneers and the inventions that led up to movies as we know them — Méliès and his imitators, the originators of narrative film here and abroad, D. W. Griffith, the rise of the studios, the advent of the talkies (often deplored), and "Golden Age" directors and stars. Later accounts add postwar neo-realism, the New Wave *auteurs,* and other highlights of more modern cinema.

This nifty item from Britain steers the same course, but covers much of the territory concisely, providing a sort of handbook for the historian. It backtracks to pick up some of the people and pictures who were ignored by more elitist predecessors (Laurel and Hardy, Ulmer, Whale, Lewton, LaCava, etc.), and

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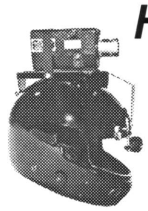
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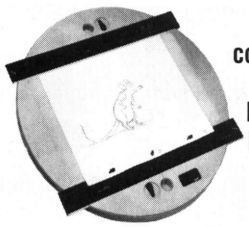

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Article Series
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ALL MODELS

The series of *Reflections* articles that appeared in *AC* from 1988 to 1993 are being expanded upon and compiled into a book. If you modeled for any of the lighting seminars featured in the articles, please contact us immediately, especially the following people: Cheryl Arutt, Bill Brady, Stan Bertheaud, Cymbidium, Bethany Glanz, Laurie Hartley, Kelly Kieran, Tanner Peterman, Lydia Wiggins, the UCLA male student who modeled for Stephen Burum, the UCLA extension students who modeled for Laszlo Kovacs and the Louis Lumière students who modeled for Philippe Rousselot and Yves Angelo.

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is replete with photos that include frame blowups of several color processes.

Vamp: The Rise and Fall of Theda Bara
by Eve Golden
Vestal Press, 288 pps., cloth, $29.95

Strange as it may seem, this is the first full-length biography of the pioneer screen siren whose name was alleged to have been created by making an anagram out of "Death Arab." One of the surprises encountered here is that this wasn't the manner in which Theodosia Goodman earned her *femme fatale* name. Quite a few other legends about the lady vampire are laid to rest as well. Though she occasionally considered writing an autobiography "because nobody ever wrote a true word about me," the actress regrettably never did. Golden's well-written tome, however, gives us the next best thing, as its taken from sources that include Bara's own scrapbooks. It's accompanied by numerous stills, a filmography, and an introduction by historian Robert Birchard.

The star, publicized as being "born in the shadow of the pyramids" to an Italian artist and a French actress, was actually a Jewish girl from Cincinnati, born in 1885. Bara rose to fame in her debut film, William Fox's 1915 production of *A Fool There Was.*

Her screen persona, including stage stardom in Paris, was created by imaginative Fox publicists. But when her career skyrocketed immediately, she happily went along with the gag. Her enormous success lasted only five years, but among her 42 pictures were such big shows as *Cleopatra, The Two Orphans, Carmen, The Serpent, The Darling of Paris, Under Two Flags, Madame DuBarry* and *Salome.*

Save that Goodman/Bara had a short, though highly successful, career as an actress, this story is not the tear-jerker one usually encounters in silent-star biographies. On the contrary, she had wealth, a long and happy marriage to famed British director Charles Brabin, and an enviable position in Beverly Hills society. Late in life she talked to Hedda Hopper about the silent movie years: "To understand those days you must consider that people believed what they saw on the screen. Nobody had destroyed the great illusion. Now they know it's all make-believe." ◆

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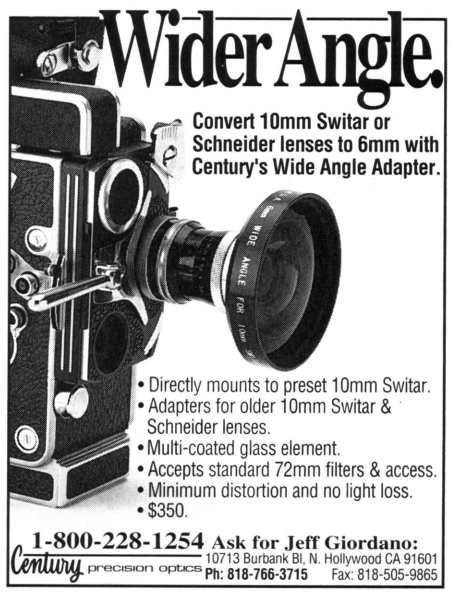

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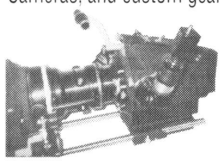

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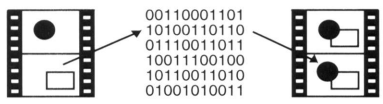

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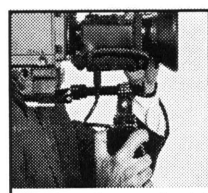

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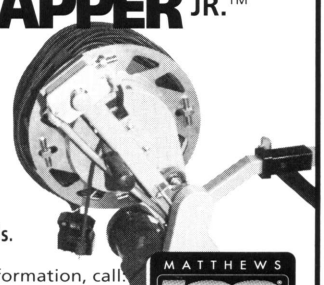

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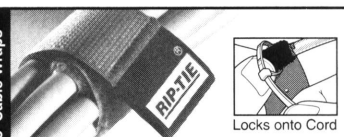

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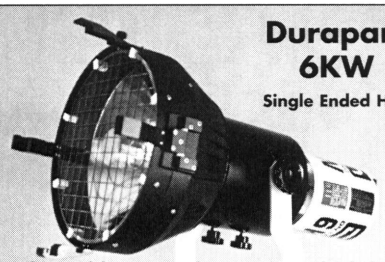

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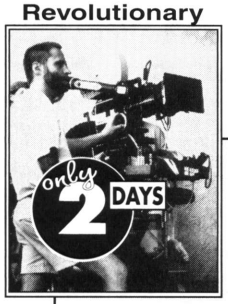

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Advertiser's Index

AC 104
Aaton 49
A & J Cases 84, 101
Action Sport 107
Adolph Gasser 85
Alan Gordon 103, 104, 106
Archive Film 103
Arriflex 18-19

Backstage Equipt. 85
Benjamin Centoducati 109
Birns & Sawyer 17, 101
Bogen Photo 87, 93
Boston Camera 85

Calzone Case Company 108
Camera Essentials 94, 103
Camware 109
Century Precision 12, 67, 105, 110
CFI 43
Chambless 108
Chapman 71
Chesapeake Camera 107
Chimera 70
Cine Rentals 105
Cine Sound 5 110
Cine South 104
CineAsst 110
Cinec 77
Cinekinetic 2
Cinema Engineering 109
Cinema Products C-2
Cinematography Electronics 6, 97
Cinequipt 76
Cineric 106
Cinovation 109
Clairmont 8-9, 75
Clamp Flag 109
Columbia College 107

Denecke 78
Dittrich, S. 110
DN Labs 108
Dreamquest 47

Eagle Systems 110
Eastman Kodak 21
Electric Image 33
Energy Productions 105

Fabulous Footage 108
Film Video 83
First Light 48
Fish Films 109
Fletcher Chicago 67
Flight Logicstics 109
Focus Optics 106
Four Designs 109
Fries Engineering 98
Fuji Motion Picture 7

Gamma & Density 96
Gene Taylor Steadicam 65
Geo Film 35
Glidecam Industries 68
Great American 22, 50
Greg Hensley 109
Gunner Light 84

H K Tecknica 109
HHB Communications C-4
Hollywood Film Inst. 108
Hybrid Cases 108
Hydroflex 108

Image G 86
Image Maker 104
Imagica USA 36
International Cinema 99
Isaia & Company 14, 76

Janice Arthur 10
JBK Cinequipt 106
J.L. Fisher 69

K&H Products 99
K 5600, Inc. 79
Kaye Lites 110
Kenworthy 69
Kino Flo 86
Kish Optics 107
Lee Utterbach 35
LentEquip 109
Leonetti 26
Light-Wave 4
London Intl. 102
Lowel Light 28
Lynx Robotic 97

MacGillivray 106
Matthews 107
Mazilview 104
Media Logic 102
Military 109
Miller Canada 107
Miller Fluid Heads 6
MKA 83
Mole Richardson 70
Movie Camera Co. 68
Movie Tech 79
Moving Cam 100
Musco Mobile 44

N.Y. Film Academy 24
Nalpak 98, 100
NCE of Florida 109, 110
Norris Film 71

O'Connor Engineering 25
Optech 98
Optex 37

Panavision Corporate 59
Panavision Fla. 87
Panavision Hollywood 1
Panico Media 36
Panther GMBH 29
Peter Lisand 107
Plume 106
Power Broker 94
Prosource 109

Quantel 15

Rafael Estrella 106
RGB Color Lab 109
Rip-Tie Co. 108
Rocky Mountain 106
Roessel Cine 94

Sachtler AG 23
SBD Tech Cine 50
ShowBiz Expo 27
Shotmaker 13, 96
SL Cine 110
SMS Productions 109
Sonosax 28
Sony Pictures 51
SpaceCam 11
Sprint 5
ST Productions 109
Stanton Video 100
Steadicam 4
Super 8 Sound 110

Target Resolution 103
Trovato 12
Tyler 97

Unilux 16

Van Diemen 99
Vancouver Film 60
Versa Flex 109
Viking Generators 87
Visual Products, Inc. 103

Weaver/Steadman 61
Wescam C-3
Whitehouse 105
Willy's Widgets 110

ZGC, Inc. 100, 102

From the Clubhouse

The ASC recently inducted Darius Wolski and Gil Hubbs into its active membership.

Wolski, a native of Warsaw, Poland, attended the Polish Film School. In 1979 he relocated to New York City, where he served as an assistant cameraman on industrials, commercials, documentaries, and low-budget features. In 1987, Wolski moved to Los Angeles and began working as a director of photography on music videos; he also shot his first feature, American Playhouse's *Land of Little Rain*, directed by Evelyn Purcell. His next project was Paul Mayersburg's *Nightfall* for Roger Corman Productions. During this time, Wolski was shooting music videos for such directors as David Fincher, Julian Temple, Russell Mulcahy and David Hogan, and commercials for director Alex Proyas. His next feature was Peter Medak's *Romeo is Bleeding*. Wolski then reteamed with Proyas as the cinematographer on *The Crow*. His commercial work attracted the attention of Tony Scott, who hired him to shoot both *Crimson Tide* [see *AC* June '96] and *The Fan* [to be covered in in next month's issue]. Wolski is currently working on Proyas' new film *Dark City*.

Hubbs began his career in documentaries, working for David Wolper, Robert Guenette and the BBC. He then moved into the commercial arena for several years, working with such agencies as Avery/Linquist, Dove Films and Filmfair. His first feature credit as a director of photography was in 1968 on Bruce Lee's breakthrough film, *Enter The Dragon* (directed by Robert Clouse). Hubbs then became an active cinematographer for both theatrical and television films. His feature credits include *Golden Needles, The Magic Machines, This is Elvis, 16 Days of Glory* and *Flowers in the Attic*. He has worked on a variety of telefilms, including *The Guyana Tragedy, Two Against the Arctic, Terror at the London Bridge, Starcrossed, California Girls* and *Children of the Night*. Hubbs has also shot such TV documentaries as *Jeddiah Smith, Primal Man, Mysteries of the Great Pyramid, Playboy's 25th Anniversary Special, Great Movie Stunts: Raiders of the Lost Ark* and *Counter Attack: Crime in America*. The cinematographer has also shot pilots for *Meet the Munceys, Whattley by the Bay, The Canterbury Tales, Paperback Writer* and *Under the Hood*. In addition to working on the television series *The Insiders, Morningstar Eveningstar*, and *Family Honor*, Hubbs has also shot some 200 episodes of the sitcom *Murphy Brown*.

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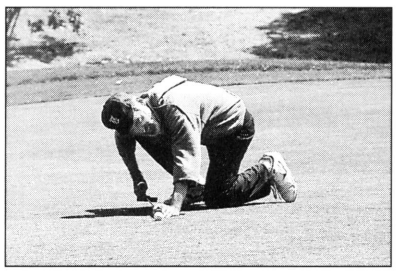

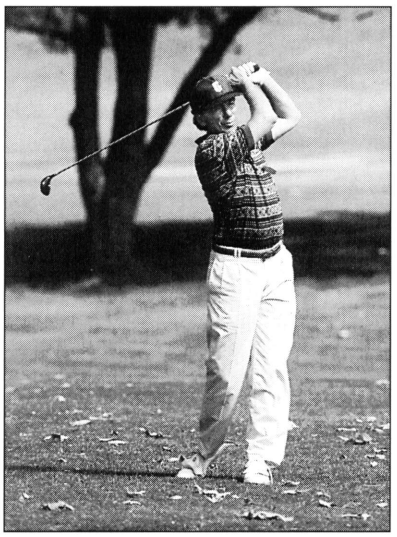

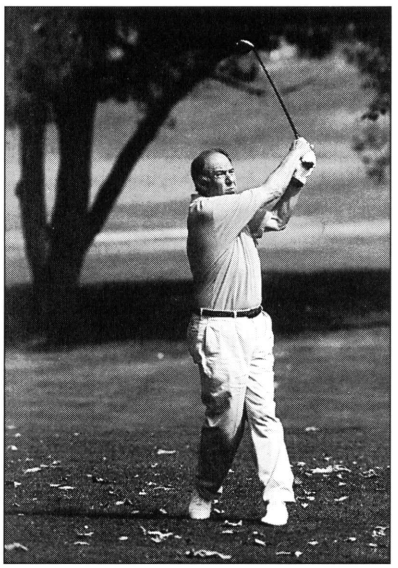

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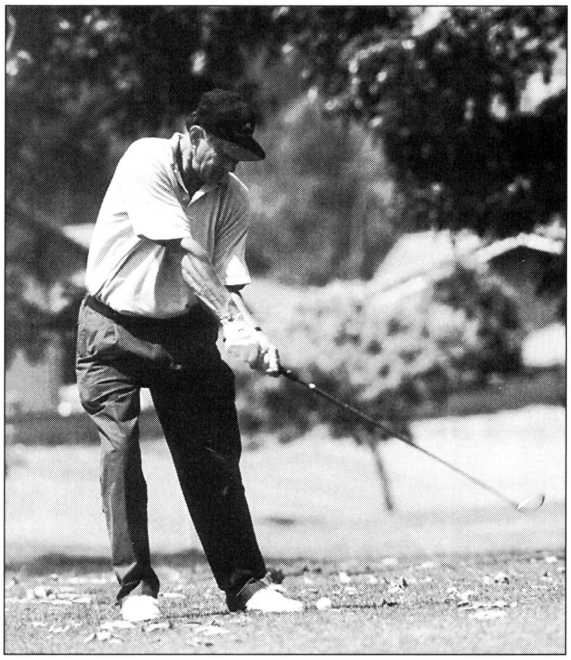

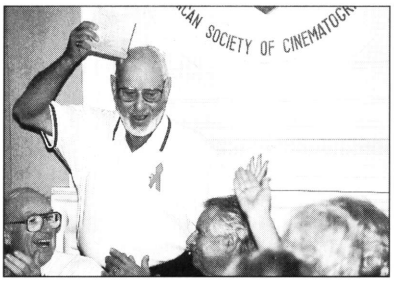

Clockwise from top left: *Woody Omens, ASC applies the "pool cue" method to his putting; links titan Owen Roizman, ASC demonstrates trophy-winning form; ASC Treasurer Howard Anderson leads the post-tournament revelry; associate member Bud Stone humbles a fairway; and Michael Margulies, ASC targets a green.*

ASC Tees Up Golf Tournament

The ASC held its 13th Annual Summer Classic at Camarillo Springs Golf Course on Sunday, June 9. For the second year in a row, ASC member Owen Roizman took the Low Gross category. He won the President's Trophy, which is the first Low Gross perpetual trophy to be awarded in the history of the summer classic. Fellow member Michael Watkins scored The Governor's Trophy by taking the lead in the Low Net category. Associate members Douglas Fries and Albert Meyer were the Low Gross and Low Net winners respectively, as were guests Lloyd Moriarty and John Caroompas. ◆

ASC Members Riposte *Variety* Article

Cinematographers respond to industry writer's contention that their craft will soon be rendered obsolete.

John Toll, ASC:

Recently, an article titled "Hi-Tech Distorts DP Domain," by Rex Weiner, appeared in the May 27-June 2 weekly edition of *Variety*. It describes how on May 4 of this year, a group of cinematographers from the ASC (including Allen Daviau, Roger Deakins, Haskell Wexler, Curtis Clark, Stephen H. Burum, Robert Primes and myself) spent a day at Digital Domain, the visual effects facility in Venice, California [see coverage in Production Slate, this issue]. The article further explained how the cinematographers conducted a lighting seminar for the digital artists and, according to the writer, "spent the rest of the day observing how the same lighting effects are created on a silicon chip."

The article then states that because of advances in digital technology, cinematographers are "scrambling to keep their focus" and are engaged in an "historic effort. . . to keep pace with the most revolutionary technological advances in filmmaking since silent pictures gave way to sound."

Having attended this event, I was completely baffled as to how someone who writes articles for a professional trade magazine could be so inaccurate in describing not only the event itself, but the intentions of those in attendance. It was like reading a film review written by a critic who hadn't bothered to watch the film; in fact, to my knowledge, the writer of the article, Mr. Rex Weiner, was not at the seminar.

At one point, the article quotes an "anonymous DP" who states that "cinematography is over, because everything can be changed in post. It's tragic." In tone, the article implies that cinematography as we know it is a thing of the past, and that cinematographers are "passing the torch" to digital artists. After reading the piece, I tried to find words to describe my reaction to it — "absurd" and "uninformed" were the kindest I could muster; "irresponsible" also came to mind.

I have been hearing about the demise of film and the end of cinematography for more than 20 years. Those ideas are usually expressed by people who are themselves ignorant of the process. Somehow, we expect more from a professional trade magazine. Predictions of tragic decline by anonymous sources seem more suitable for the tabloids than for the trades.

Cinematographers are constantly educating themselves about all forms of new technology, and throughout the history of cinema they have been among the major innovators behind the technology that has created and sustained the motion-picture business. Part of the purpose of the ASC is to provide cinematographers with a way of sharing information. Participating in an event such as the Digital Domain seminar was a normal activity for ASC members, who quite frequently share their experience and knowledge with each other, as well as with many other groups throughout the industry.

The management of Digital Domain had suggested the seminar as a way of introducting their digital artists to lighting techniques used by working cinematographers. In return, the cinematographers were offered a demonstration of various digital effects techniques currently used at Digital Domain, as well as hands-on advice about the Cineon and Flint digital workstations recently installed at the ASC Clubhouse.

Digital manipulation of images is obviously a powerful new tool, and an important part of our industry, but it is not a substitute for cinematography. I know of no informed person working in the field of digital effects who suggests that it is.

Cinematographers don't perceive new technology as a threat. We have always used new technologies in performing our main objective — creating moving images with the greatest degree of artistry and craftsmanship that we can bring to the process. The digital artists attending the seminar shared that attitude and the cinematographers, rather than "scrambling to keep their focus," had a great day in a collaborative exchange of ideas and techniques.

Even an anonymous cinematographer would find it difficult to understand how this activity could be characterized as "passing the torch," or find it a reason to declare that "cinematography is over."

Robert Primes, ASC:

I also take exception to the article "Hi-Tech Distorts DP Domain." In my opinion, Mr. Weiner reported a distorted and inaccurate point of view concerning the proceedings at Digital Domain.

Because no one can yet predict the capability of future computer systems, it is easy to imagine digitally created actors, sets, lighting and direction. Whether or not they will ever occur and what the artistic quality will be is open to debate. But what seems perfectly clear is that in its present state, and in the hands of an artist, digital effects can most certainly enhance photography. It is therefore appropriate that directors of photography, who are the authors of the visual images seen in films, should understand and participate in the digital enhancement of the images they create.

Toward that end, Eastman Kodak and Discreet Logic have loaned digital workstations to the ASC to help familiarize cinematographers with this process. Additionally, over the past several years, Boss Film Studios, Composite Image Systems, Digital Domain, Kodak Cinesite, Laser Pacific, the Post Group and Quantel have all provided seminars and instruction in digital image manipulation to ASC members.

Contrary to Mr. Weiner's sensationalized assertion that cinematographers are "scrambling to keep their focus," we are merely keeping up with current technology — as we have done since the ASC was founded in 1919. ◆

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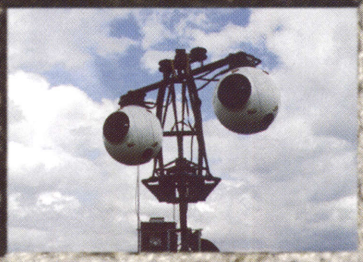

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